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INDEX OF CONTENTS.

Nos.

MISCELLANEOUS Abstr. 89. Noted 44 3409-3499r
- General 3409-3419
- Statistical methods 3420-3421
- Horticultural economics 3422-3424
- Atmospheric pollution 3425-3429
- Bees and nectar 3430-3432
- Biochemistry 3433-3442
- Physiology 3443-3455
- Growth substances 3456-3464
- Tissue culture 3465-3466
- Seeds and seed treatment 3467-3475
- Nutrition 3476-3483
- Soil conditioners 3484-3485
- Irrigation 3486-3488
- Glasshouses and frames 3489-3497
- Noted 3498a-3499r

TREE FRUITS, DECIDUOUS Abstr. 116. Noted 34 3500-3617h
- General 3500-3505
- Breeding and varieties 3506-3524
- Propagation and rootstocks 3525-3538
- Pollination 3539-3542
- Growth phenomena 3543-3553
- Pruning and training 3554-3557
- Spraying for cultural purposes .. 3558-3567
- Nutrition 3568-3581
- Soil management 3582-3585
- Harvesting 3586-3593
- Grading and packing 3594-3595
- Storage 3596-3605
- Composition of fruit 3606-3613
- Processing 3614-3615
- Noted 3616a-3617h

SMALL FRUITS, VINES AND NUTS Abstr. 55. Noted 21 3618-3673u
- Small fruits 3618-3643
- Vines 3644-3670
- Nuts 3671-3672
- Noted 3673a-3673u

PLANT PROTECTION OF DECIDUOUS FRUITS Abstr. 133. Noted 37 3674-3808k
- General 3674-3677
- Disturbances of genetic origin .. 3678-3680
- Disturbances of nutrition or of unknown origin 3681-3692
- Environmental or climatic factors .. 3693-3704
- Viruses 3705-3716
- Bacteria 3717-3723
- Fungi 3724-3751
- Nematodes 3752-3755
- Mites 3756-3764
- Insect pests 3765-3784
- Birds 3785
- Rodents 3786
- Fungicides and insecticides 3787-3793
- Spray application and effects .. 3794-3806
- Noted 3807a-3808k

WEEDS AND WEED CONTROL Abstr. 88. Noted 20 3809-3897t
- General 3809-3812
- Biological control 3813-3817
- Particular weeds 3818-3826
- Weeds in water and irrigated areas .. 3827-3835
- Control of woody plants 3836-3843
- Weed control in fruit crops 3844-3849
- Weed control in ornamentals 3850-3853
- Weed control in tropical crops .. 3854-3862
- Weed control in vegetables 3863-3870
- Herbicides and apparatus 3871-3896
- Noted 3897a-3897t

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE Abstr. 167. Noted 42 3898-4066p
- General 3898-3920
- Asparagus 3921
- Brassicas 3922-3936
- Celery 3937-3938
- Cucurbits 3939-3943
- Legumes 3944-3975
- Mushrooms 3976-3979
- Onions and related crops 3980-3992
- Rhubarb 3993
- Root crops 3994-4002
- Salad crops 4003-4009
- Spinach 4010-4012
- Tomatoes, capsicums and eggplants .. 4013-4062
- Sundry 4063-4064
- Noted 4065a-4066p

TOBACCO Abstr. 56. Noted 10 4067-4123j
- General 4067-4068
- Breeding and varieties 4069-4070
- Sowing, planting and cultural treatments 4071-4075
- Nutrition 4076-4081
- Quality, physiology and composition 4082-4093
- Diseases 4094-4116
- Nematode and insect pests 4117-4122
- Noted 4123a-4123j

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS Abstr. 48. Noted 13 4124-4172m
- General 4124
- Culinary and spice plants 4125-4127
- Drug plants 4128-4135
- Essential oils 4136-4139
- Fibres 4140
- Gums 4141-4142
- Hops 4143-4156
- Insecticidal plants 4157-4158
- Rubber plants 4159-4160

INDEX OF CONTENTS—*continued*

Nos.
Seed oils 4161-4167
Tannin plants 4168
Waxes 4169
Sundry plants 4170-4171
Noted 4172a-4172m

FLORICULTURE Abstr. 95. Noted 42 4173-4269p
General 4173-4178
Annual and herbaceous plants .. 4179-4208
Bulbs, tubers, etc. 4209-4222
Lawns 4223-4226
Succulents 4227-4230
Roses 4231-4239
Other trees and shrubs 4240-4267
Noted 4268a-4269p

SUB-TROPICAL FRUIT AND PLANTATION CROPS Abstr. 70. Noted 14 4270-4340n
Avocadoes 4270-4271
Citrus—general 4272
Citrus—varieties, rootstocks and propagation 4273-4276
Citrus—soils, tree composition and nutrition 4277-4293
Citrus—climate, irrigation and air pollution 4294-4296
Citrus—flowering, fruiting and pollination 4297-4299
Citrus—diseases and pests 4300-4312
Citrus—handling, fruit composition and storage 4313-4320

Nos.
Dates 4321-4325
Litchis 4326
Macadamias 4327
Olives 4328-4337
Passion fruit 4338
Tung 4339
Noted 4340a-4340n

TROPICAL FRUIT AND PLANTATION CROPS Abstr. 108. Noted 39 4341-4450m
General 4341-4343
Bananas 4344-4350
Cacao 4351-4370
Coconuts 4371-4376
Coffee 4377-4389
Mangoes 4390-4391
Oil palms 4392-4397
Papaws 4398-4399
Rubber trees 4400-4410
Sugar cane 4411-4436
Tea 4437-4443
Sundry crops 4444-4448
Noted 4449a-4450m

NOTES ON BOOKS AND REPORTS Abstr. 36. Noted 21 4451-4487u
Books 4451-4461
Annuals and reports 4462-4485
New periodicals 4486
Noted 4487a-4487u

Total abstracts 1,061. Noted 337.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

EDITORIAL NOTES

DRAWING ATTENTION TO THE INDEX

Readers of *Horticultural Abstracts* will receive as part of Vol. 25 not a mere annual index but a cumulative index covering Vols. 21-25. Those who already possess Vols. 21-24 should find it a comprehensive guide to work recorded in those volumes. Others who have only recently become subscribers may want to get the earlier volumes. They should order them without delay as stocks are low.

We ourselves find these composite indexes extremely useful in answering enquiries and we are convinced that many an enlightened reader of *Horticultural Abstracts* could save himself much trouble by using them in conjunction with the abstracts themselves to inform himself of recent work on particular problems.

We apologize to librarians for the headache involved in the decision, which we also shall have to make, whether to bind the 5-year index with Vol. 25 or separately. We do, however, want to give our readers the benefit of accumulated work, and since experience indicates that lamentably few of them buy such an index, well just this time and probably only this time here it is covered by the subscription!

CONFERENCES.

Conferences recently attended at Scheveningen and in Paris and London have concerned Horticulture, Tobacco and Cacao respectively. It is hoped to give abstracts of the papers presented in Vol. 26, No. 1.

SALIENT ITEMS. Vol. 25. No. 4.

DISEASE AND PEST CONTROL.

Chemicals:—The effects of sprays on apple trees are examined in four papers (3732, 3779, 3790, 3791) and on wild life in two others (3802, 3803). Among new compounds is iridomyrmecin, an insecticide extracted from an ant (3792) and an improved sticker (3796). Readers, who like ourselves, are apt to find the existing multiplicity of compounds confusing may find abstract 3787 helpful, or they may, like many

Nova Scotia apple growers, decide to revert to the pre-war type of spray programme using the well known older spray materials (3799).

Laboratory and field trials:—It is disconcerting to read that several fungicides caused inhibition of spore germination in *Botrytis* at two concentration ranges but allowed complete germination to occur at intermediate concentrations (3742). Methods of estimating numbers of red spider mites are considered in two papers (3756, 3757) and statistical aspects of trials on their control are examined in a third (3758).

Antibiotics:—The action of antibiotics against bacteria can be enhanced by the addition of growth substances (3720) and glycerine (3958). Culture filtrates of a *Penicillium* and a *Streptomyces* used for seed treatment have greatly reduced the incidence of halo blight in beans (3957), and there are also indications that certain antibiotics may have beneficial effects against virus diseases (3712, 3955).

Soil sickness and soil fumigation:—There is increasing evidence that nematodes play an important part in promoting "soil sickness" in many crops (3753-3755, 3962), although in some cases it would appear that fungi may be the principal agents (3738). For soil treatment fumigants impregnated on vermiculite may give better results than liquid applications (4120). Of particular interest are encouraging results obtained with nematocides and other control measures for the destruction of nematodes in or on the roots of living plants (3752, 4176, 4225, 4226, 4300, 4336).

Viruses:—In addition to the antibiotics mentioned above there is evidence that seed extracts of certain plants can inhibit infection of the same plants by virus diseases (4102). Another approach to the problem of control is suggested by the discovery that if peach budwood is stored the "viability" of western X-disease virus gradually declines (3713). Mention may also be made of an improved tetrazolium colour test for detecting the presence of viruses in plants (3916).

Birds:—Complete protection is claimed for the latest scaring device, an electrically operated wooden rattle producing short, sharp bursts of noise (3785).

ECONOMICS.

General:—In so far as horticulture is concerned economic studies are still comparatively rare, but, as the small collection of papers in this number of *Horticultural Abstracts* shows, they can contribute materially to more efficient crop production. The current batch includes papers on the economics of fruit production in several European countries (3424, 3504, 3505), the cost of weed control in irrigated crops in California (3834) and changes in consumer preferences in the U.S.A. which are likely to affect the future of the deciduous fruit industry (3503).

Work studies:—General time and motion studies are reported from Britain and Sweden (3422, 3423) and the latter are supplemented by a specific investigation on methods of stringing carnations (4184). From California come papers on the methods and costs of harvesting prunes (3590, 3591) and on systems of paying workers in grape packing houses (3667).

MACHINERY AND EQUIPMENT.

Machines and implements:—Apart from a general report on sugar cane mechanization in South Africa (4415) and a description of a weed burning unit (3895) all the machines, implements and tools described in this number of *Horticultural Abstracts* are concerned with the harvesting and handling of crops. They include equipment for picking or transporting cherries (3592), citrus (4313), prunes (3590, 3591), macadamia nuts (4327), sugar-cane (4433) and vegetables (3914), as well as a mobile orchard ladder (3593), a fruit grader (3594), an automatic apple box filler (3595), a blueberry stemmer (3628) and a laboratory seed sizer (3473).

Apparatus:—These include a dendrometer for measuring trunk diameter increases of trees (3546), a device for measuring soil fertilizer contents (3477), portable apparatus for determining moisture content in cacao beans (4369), instruments for measuring colour in foods (4053), improved apparatus for measuring protoplasmic streaming in cells (3456), an electric vibrator to assist tomato pollination (4028), and, perhaps most ambitious of all, apparatus for estimating flavours in vegetables (3915).

Glasshouses and other forms of protection:—In addition to general papers on glasshouse design (3489-3491), there is an account of the effects of glass covers on soil and air temperatures (3492), comparisons between different types of glass (4023) and between glass and plastics (3493, 3942), and information on vegetable crop responses to the use of plant protectors on the Canadian prairies (4027, 4057).

Irrigation:—A study on water distribution patterns from rotary sprinklers deserves attention (3488).

PLANT NUTRITION.

Sawdust and soil conditioners:—Further Canadian experiments emphasize the general beneficial effects of sawdust mulches for small fruits (3618, 3627, 3629, 3630). New soil conditioners improve soil structure but do not invariably increase crop yields (3484, 3485).

Nutrient absorption:—In apple trees grown in soilless culture N and water absorption were directly correlated with air temperature (3573), and temperature also affected the absorption of foliar applied P by chrysanthemum plants (4194) and of urea by citrus leaves (4288). In apple orchards soil and leaf K were correlated, but no relationship was found between soil and leaf contents of other elements (3571).

Nitrogen:—Attention is drawn to a detailed study of N translocation in citrus trees (4285).

Potassium:—Among many papers touching on various aspects of K nutrition is one on N-K interactions (4080), another on period of K supply (4081) and two on Na-K relationships (3581, 4079).

Boron:—Fifteen postulated roles of B in plants are examined in a critical review (3482), and the interactions of B with other elements in the apple are examined in two papers (3580, 3683).

Chlorosis and iron:—There is evidence that the bicarbonate ion can be directly responsible for chlorosis in plants (3953). Iron-deficient roses and gardenias responded as well to a chelating agent applied alone as to an iron chelate complex (4238). A new chelating compound, an aromatic amine designated Fe 138, has shown particular promise on calcareous soils on which other chelates have failed to correct chlorosis (3483).

Cobalt:—In conjunction with zinc cobalt appears in the role of vine nutrient (3659, 3660).

Molybdenum:—Further information is given on the relationships between Mo and N in plant nutrition (3931, 3932).

Sulphur:—Elemental sulphur dust applied to citrus leaves can be absorbed and synthesized into protein with benefit to fruit quality (4291). On the other hand, S, applied to the soil, lowers pH and may reduce the growth of citrus trees (4279), and where subsoil acidity results from its use with ammonium N this may prove difficult to correct (4280). In onions S has been shown to affect carbohydrate metabolism (3986).

Statistical upheaval:—The "agrobiologic percentage method" of evaluating the results of fertilizer trials is claimed to be better than the conventional analysis of variance (3420).

PLANT PROPAGATION.

General:—It may be sobering to open this section with a reference to a thesis on the history of vegetative propagation in England, which shows that much which we regard as modern was known 300 to 400 years ago (3409). On the other hand, a supplement to the Dutch booklet "Plants in plastic" is undeniably new (4174).

Seed and seedlings:—Seed quality may vary with position of the fruit on the mother plant (4022). Some seeds may remain viable for years in deep-freeze storage (3472). Combined treatment with chemicals and ultrasonic vibrations can be used to rid seeds of fungi and bacteria (3474). At least one mercurial fungicide has been shown to induce polyploidy (3475). Soaking seeds in water under pressure does not seem to be a promising way of improving germination (3467). The use of mountain soils for lowland tobacco seedbeds provides a means of overcoming disease troubles (4072). Among other papers are several dealing with the physiology of germinating seeds as affected by growth regulators, light or temperature (3468-3471, 3908, 4071) and one on the culture of cyclamen embryos (4211).

Cuttings and layers:—For apples a method of stimulating the development of sphaeroblast shoots, from which free-rooting cuttings can be obtained, is described (3526). The development of carnation cuttings is affected by soil aggregation (4183) and that of root cuttings of deciduous tree fruits by depth of planting and other treatments (3527). A detailed study on sugar cane setts is of interest as throwing light on the different responses of terminal and basal cuttings to auxin and sucrose treatments and on various interactions including auxin/carbohydrate metabolism relations (4417). A second paper on sugar cane setts shows that bud dormancy induced by heat treatment can be overcome by treatment with sodium peroxide (4418). There are many other papers on cuttings, especially in the section on Floriculture.

Grafting:—For vines a green-wood grafting technique is described which produces plants suitable for field planting in a single season (3654).

Stock-scion compatibility:—Different methods of evaluating stock-scion compatibility in apples vary in their reliability (3537). Incompatibility between stock and scion is not necessarily overcome by the use of a compatible interstock (3538). The symptoms of disorders resulting from the use of Virginia Crab, either as an interstock or as a rootstock, for various apple varieties suggests that these varieties may contain a latent virus (3689, 3690). Similarly, a lethal factor, either toxin or virus, occurring in the scion, would explain the symptoms induced in a peach by ring-grafting a compatible rootstock stem with a strip of bark from an incompatible stock (3691) and also symptoms occurring in Stanley prune trees worked on Myrobalan stocks (3692).

SUPPLEMENTARY LIGHT.

General:—The use of supplementary light in horticulture was one of the subjects which aroused particular interest at the 14th International Horticultural Congress, an interest which is also reflected in the large number of papers now appearing on the subject. Two of these deal with the types of light used and their spectral compositions (3447, 3448).

Light intensity:—The effects of increasing light intensity by supplying supplementary light or of reducing it by shading are described in papers on roses (4236, 4237), saintpaulias (4201) and tomatoes (3907, 4025, 4039).

Photoperiodism:—Both fundamental and applied research on the effects of photoperiod and on the interrelationships between photoperiod and temperature are well represented (3443-3446, 3992, 4012, 4188-4193, 4202, 4210, 4213, 4214, 4228-4230, 4264).

WEATHER, MOSTLY BAD.

Frost:—The rival claims of electrical conductivity readings and periderm thickness measurements as means of determining winter hardiness in apples are taken a stage further (3549-3551). In sweet peas frost resistance varies with variety, sugar content and leaf position (4206). In tung each of the major nutrient elements may affect susceptibility to injury by early or late frosts (4339). Breeding studies with brussels sprouts have revealed a heterosis effect for cold resistance (3925). A novel method of enhancing frost resistance is to treat the seed or young seedlings of sensitive plants with leaf extracts from a winter hardy plant (4204).

Hail:—Fireworks enthusiasts will be sorry to hear that Swiss attempts to prevent the formation of hail storms with rockets have been abandoned (3700). They are continuing trials on cloud seeding (3701).

Rain:—Water dripping on cacao pods can markedly increase cherelle wilt [drop of young fruits] (4362).

Smog:—From California come five papers (3426-3429, 4296) dealing with various aspects of smog damage, including the use of test plants and a new method of diagnosis based on the pattern of damage in relation to cell maturity; motor car exhaust fumes come in for further blame. Italy also contributes a paper on the effect of toxic gases produced by industries (3425). For those particularly interested in fluorides two papers dealing with their determination are noted (3499a, 3499b).

MISCELLANEOUS.

Colchicine:—A new method of inducing polyploidy with colchicine is described in 3416.

Colour standards:—For three methods used in the inspection of horticultural products in California see 3417.

Fruit preservation:—Work by the D.S.I.R.(U.K.) on the use of ionizing radiations to preserve food and on the use of CO_2 in soft fruit transport may be of interest (3418, 3635).

Leaf structure:—The upper leaves of tomato plants show a more pronounced xeromorphic structure than the lower (3454).

Weeds:—Two papers throw light on the mechanism of herbicidal selectivity (3876, 3877). A new somewhat violent-sounding method of killing weeds is also available (3893).

Vocabulary:—We are glad to record that F.A.O., with the aid of our Rothamsted colleague, has produced a soil science vocabulary in no less than 8 languages (4456).

MISCELLANEOUS.

General.

(*See also* 3498f, o, v, 3499m, q, 4453, 4456, 4459, 4460, 4463, 4467, 4480, 4482, 4486, 4487c-h, k, l, q, s, t.)

3409. Marston, M. E.
The history of plant propagation in England to 1850.
M.Sc. Thesis Nottingham University, 1953, pp. (typescript) 158, bound, annotated bibliography.*

Miss Marston's enjoyment of her considerable task has gilded what otherwise might have been a somewhat dull catalogue. Loudon's comprehensive *Horticulturist* (1849) neatly closed the period and was a suitable stopping place.

The thesis is concerned with vegetative methods and quickly passes over the modification of "natural" forms of multiplication to the increasingly "artificial" techniques of layering, taking cuttings, rootstock selection, grafting and budding. A fifteenth-century poem by John Gardener, the earliest work found, is full of sound practical advice and stresses such things as the matching of stock and scion and the exclusion of rain from the new union. Even at that time the essentials were grasped, though often the reasons given may now appear strange.

Up to the middle of the eighteenth century layering was the chief means of pure propagation, as distinct from grafting, and it was only later that cuttings, particularly of the semi-hard and softwood types, were commonly employed, coinciding with the wider use of glass protection. It is topical to note that leaf-bud cuttings of common laurel were successfully rooted by Barnes in 1757 who obtained "as many plants . . . as there were buds upon the branch".

The importance of propagating only from really healthy trees was fully realized in the sixteenth century, and though little stress was placed on this towards the end of the period under review, by the middle of the twentieth century we are once again in full agreement. In a concise discussion Miss Marston relates the earlier practices to those of today and we see how well many of the oldest, born of trial and error, are standing up to scientific examination; the techniques remain, only the explanations have changed.

In addition to a bibliography there are some intriguing biographical notes on the authors and an enjoyable glossary in which "assets" are described as small bulbs! Incidentally, one misses "inoculation", a word of garden origin later filched by pathologists. A few dates given seem irreconcilable. Drope, given as 1662 on p. 131, is 1672 in the bibliography, and the first botanic garden (at Oxford) is said to have started in 1632 when in fact it was then eleven years old.

Miss Marston deserves our gratitude for examining the large amount of almost inaccessible material and for showing us, so clearly, the trends in vegetative propagation technique which are not only of historical interest but of considerable value in helping us to appreciate the basis on which we are to build. R.J.G.

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* Copy can be consulted in library of the Department of Horticulture, School of Agriculture, Nottingham Univ., Sutton Bonington.

3410. Hudson, J. P.
Factors affecting the regeneration of plants from roots.
Ph.D. Thesis, Nottingham University, 1954, pp. (typescript) 189, bibl. 171+check list of plants regenerating from roots incl. bibl. 64.*

The regenerative capacity of plants derives from a projection of normal morphosis in which, besides primary meristems with unbroken embryonic lineage, centres of cell-division arise adventitiously. These differentiate into shoot or root initials, whose location in the complementary organ tends towards an inward "wholeness" reminiscent of axile development of the embryo into plumule and radicle. In these terms "regeneration" is definable as the formation of new polar entities within plants leading to the production of vegetative progeny.

Of the two broad types of regeneration much less is known of the regenerative behaviour of roots than of shoots, which makes Dr. Hudson's comprehensive study such a welcome one. His detailed classification is based on the distinction between suckers occurring spontaneously on uninjured roots and those developing only after injury or severance, including the root cutting severed artificially by the propagator and removed from its environment. Propagative success must depend on the natural regenerative habit of the particular plant. The experiments described reveal in raspberry, the main experimental subject of this thesis, a marked periodicity, with an "off" season when the capacity to regenerate is negligible and an "on" season from October to March when the capacity is strong. [See also *H.A.*, 24: 206.] During the summer few buds form on the roots, and even those already in existence do not develop at this time, so a plant made destitute of aerial shoots has poor survival prospects. In the "on" season the regenerative behaviour of the root cutting is determined predominantly by that of its buds, particularly in their "subterranean" phase of growth whose completion usually ensures successful establishment. The relative durations of subsequent "rosette" and "cane" phases are determined by ambient temperature. Temperature also controls the initial elongation of the buds. As the threshold temperature, below which elongation ceases, varies with initial bud size when the root cutting is taken, there is a complex interaction of bud behaviour with external environment. It is pertinent to note, too, the strong regenerative power of the sucker shoot itself, with the intriguing effect that many progeny are, by a process of double regeneration, entirely new relative to the parent plant.

From raspberry Dr. Hudson has proceeded to a systematic examination of many other plants, testing their root cuttings for periodicity of behaviour and for temperature responses. This has precipitated sharp encounter with the "shy-shooter", and at this challenging point the thesis ends, its conclusion that such root cuttings possess no shoot meristems when cut succinctly specifying the basic problem of the experimenter. The further conclusion that failure to regenerate may sometimes be attributed to an inherent incapacity to produce adventitious meristems is, it is to be hoped, unwarranted. The grounds put forward of prolonged survival without any reaction could similarly be cited for shoot cuttings, but in their case shyness to regenerate has been overcome by sensitizing treatments quite superfluous for the ready "rooter". Drawing the obvious parallel, the raspberry is a ready "shooter" and further intensive experiment must be extended to other more difficult species, as indeed Dr. Hudson intends; the probability is that their wide range of regenerative behaviour can be typified by a small number of selected "guinea-pigs".

Meanwhile, all who are privileged to consult this thesis will derive much benefit from the meticulous survey of all aspects of the literature on root regeneration, and from the wealth of factual detail which has been amassed. E.S.J.H.

3411. Johnstone, K. H.
Horticulture in the Tamar Valley.
Agriculture, Lond., 1955, **62**: 123-9, bibl. 7, illus.

Horticulture in the Tamar Valley is centred on the production of early fruit and flowers. The holdings are generally small. Strawberries (Mme Lefebvre, Early Cambridge and Prizewinner) are the most important of the fruits grown. The standard market varieties of narcissus and anemones have been grown extensively since the war. Soil-borne pests and diseases, and the maintenance of soil fertility are the biggest problems.

3412. Harrison, A. D., and Kent, W. G.
Commercial horticulture in Kent.
Sci. Hort., 1952-54, **11**: 28-40.

Fruit-growing, market-gardening, glasshouse crops, hardy flowers and nursery stock, and seed production.

3413. Scarlett, R. L.
Lothians' horticulture.
Scot. Agric., 1955, **35**: 23-7, illus.

The development and future of market gardening in the area around Edinburgh is surveyed. Vegetables grown here form two-thirds of the total amount grown in Scotland.

3414. N.A.A.S.
The N.A.A.S. Experimental Horticulture Stations, Progress Report No. 2, 1955, pp. 9, 23 Soho Square, London, W.1.

Brief summaries on the nature and location of the Experimental Stations are given, and their research programmes are outlined.

3415. Anon.
The Horticultural Demonstration Centre, Loughgall, County Armagh.
Res. exp. Rec. Minist. Agric. N. Ireland, 1952/53 (issued 1955), **3**: 242-7.

Accounts are given of 4 trials conducted in 1953. (1) *Apple orchard spray trials.* Four spray materials were compared for the control of scab on Bramley's Seedling, applications being made 10 times between 26 March and 4 August inclusive. PMC formulated with lead arsenate and S.R.406 both gave very good control, namely, 9 and 1% scabbed fruit respectively, compared with 96% in the control. Sprayed fruit was larger than unsprayed, ranging from just over 2 to just over 3½ in. in diameter with 3 in. being the commonest size, compared with 1¼ to just over 3 in. with 2⅛ in. the commonest size. (2) *Orchard sward trials.* A study was made of the effect on broad-leaved weeds in general and buttercups in particular of the customary spring and autumn mowing *vs* regular close mowing, with or without spraying with MCPA at 5 pints per 100 gal. water per acre in mid-May, mid-June and the beginning of July. MCPA gave very good control of buttercups but had no effect on nettles, bishopsweed or hogweed; regular gang-mowing without herbicide encouraged buttercups. (3) *Weed control in strawberry plantations.* Climax were sprayed in early August with sodium chlorate at concentrations and rates ranging from 1% at 200 gal. per acre to 2% at 400, or with sulphuric acid ranging from 1·75% to 7% with 200 gal. applied to 3·5% with 400 gal. applied, the spray being directed onto the weeds, but no effort being made to avoid the strawberries. Sodium chlorate gave complete control of both grass and broad-leaved weeds, the plots being still weed-free after 8 weeks, but caused considerable scorching of the strawberry foliage. Sulphuric acid controlled broad-leaved weeds but not grass; it scorched the outer leaves of the strawberries but the young leaves and crowns were unharmed. (4) *Brussels sprouts variety trials.* Of 5 varieties tested, greatest total weight, greatest average weight per plant and greatest weight per acre were given by Cambridge No. I, Cambridge No. V being next best.

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* Copy can be consulted in library of the Department of Horticulture, School of Agriculture, Nottingham Univ., Sutton Bonington.

3416. BECKER, G., AND SKIEBE, K.
Eine neue Methode der Colchicinbehandlung. **(A new method of applying colchicine.)**
Züchter, 1955, **25**: 161-3, bibl. 12, illus.

In an attempt to avoid the root damage commonly resulting from colchicine treatment, treated shoots (24-96 hours in 0·01–0·1% aqueous colchicine solution) were grafted on rootstocks not subjected to the toxic action of the chemical. The plants were then kept for a fortnight at 20° C. in an atmosphere of 90–95% relative humidity. The new method was successfully applied to a wide range of genera, but it is thought to be of special significance for plants for which other techniques have proved unsuitable. A fair number of dwarf beans, for instance, were polyploidized by grafting the treated shoots on *Phaseolus coccineus.* The technique is illustrated.

3417. WHIPPLE, S. R.
Color inspection—fresh fruits and vegetables.
Bull. Calif. Dep. Agric., 1955, **44**: 47-55, bibl. 8, illus.

Under Californian State law several horticultural products are required to meet a certain colour standard at harvest. Three of the newer methods of applying such a standard are presented, namely a plastic disc, a colour photograph, and an electronic instrument called an Agtron.

3418. HANNAN, R. S.
Scientific and technological problems involved in using ionizing radiations for the preservation of food.
Food Invest. Spec. Rep. D.S.I.R. Lond. **61,** 1955, pp. 192, bibl, 441, illus., 7s. 6d.

World literature and work at the Low Temperature Research Station, Cambridge, on radiation sterilization is reviewed critically and in detail. Of the ionizing radiations which could be considered for use in the food industry, gamma rays, cathode rays and soft X-rays appear to be potentially the most useful. Advantages of the process include highly efficient inactivation of micro-organisms and other forms of life, a very small rise in temperature and only slight total chemical change; disadvantages include high cost of developmental work and equipment, deleterious effects on quality and storage life, and the need for strict safety precautions. In the section dealing with the sterilization of vegetables and fruits results are given of investigations on peas, broad beans, carrots, lettuce, asparagus, rhubarb, soft fruits, cherries, tomatoes and fruit juices. It is concluded that large doses of irradiation may cause serious loss of texture, bleaching, development of a typical irradiation flavour and loss of characteristic flavour. Protective methods investigated have been only partially successful in preventing these changes. Residual metabolic or enzymic activity may also occur which may limit the storage life of the products. Medium doses, of approximately 100,000 to 1,000,000 rep, might be used for a number of procedures mainly auxiliary to other methods of processing or storage. Small doses, of approximately 100,000 rep or less, have been used to delay the ripening of fruit and to reduce microbial contamination on the fruit surface, but the potential commercial value of such treatment is still far from clear. One interesting development is based on the observation that irradiated polythene does not melt at temperatures sufficiently high for some types of heat-processing, so that processing of food in polythene bags may become possible.

3419. U.S. LIBRARY OF CONGRESS.
Scientific and technical serial publications, United States, 1950-1953.
(*Publ.*) *U.S. Libr. Congr.*, 1954, pp. 238.

This bibliography is one of a series planned by the Library of Congress "to determine more exactly the world output of scientific and technical publications". It covers government and non-government publications issued in the United States between 1950 and 1953 (with some 1954 titles added) which contain "a reasonable amount of information on current scientific research and its applications". Tobacco, sugar, horticulture, lawns, and arboriculture are among the subjects covered.

Statistical methods.

3420. WILLCOX, O. W.
Agrobiologic percentage method of evaluating fertilizer tests: I. Potash and tobacco.
Soil Sci., 1955, **79**: 467-73, bibl. 8.

This is the first of two papers designed to demonstrate the use of the Mitscherlich-Baule yield equation and the standard yield diagram as a substitute for, and an improvement on, the current statistical methods of evaluating the results of operations with crops and fertilizers. Its use is exemplified by field practice. The conclusions reached through the percentage method are compared with conclusions drawn from a conventional analysis of variance. From this comparison it is inferred that the percentage method is preferable. [From author's summary.]—197 Union Street, Ridgewood, N.J.

3421. JESSEN, R. J.
Determining the fruit count on a tree by randomized branch sampling.
Biometrics, 1955, **11**: 99-109.

A complete count of all fruits on an orange tree was made and the number found on each branch was recorded. Each branch having a circumference value of 1 in. or more near the forking was measured. A total of 1,379 fruits was counted. Three methods of selecting branches as samples for estimating the total number of fruits were tested. Three different branch sizes were tested for efficiency. A method of selecting branches, wherein each branch at a forking is given a probability of selection proportional to its cross-sectional area, was found to be quite efficient. In fact, this scheme gave efficiency comparable to that in which each fruiting branch is selected with equal probability. The equal probability scheme is not practicable, since it requires some identification of all fruiting branches before sampling can be carried out. The unequal probability scheme described herein does not require this information for unbiased estimates. [Author's summary.]—Iowa St. Coll., Ames.

Horticultural economics.

(*See also* 3499j, 3501-3505.)

3422. BRITISH PRODUCTIVITY COUNCIL.*
Horticulture.
B.P.C. Case Studies, 1955, pp. 23-5.

Work studies in a well-known horticultural and agricultural demonstration estate resulted in wage savings of 6% in the Market Garden section and 28% in the Dutch Lights section. Incentive schemes in individual jobs such as leek hoeing, double digging, and cabbage and gladiolus planting gave, on an average, a 50% reduction in man-hours, a 30% reduction in cost and a 30% increase in wages.

3423. FJÄDERHANE, A. M.
Arbetsstudier i trädgårdsodlingen. (**Time studies in horticulture.**) [List of contents in English.]
Medd. Alnarpsinst. trädgårdsekon. Byrån **17**, 1955, pp. 80, illus.

Detailed information is presented on the number of man-hours required for a variety of operations in the glasshouse culture of flowers (pp. 2-48), in the nursery (pp. 49-55), in the orchard (cherry picking, pp. 55-56), in landscape gardening (pp. 57-67) and in cemeteries (pp. 68-80). [For an outline of this time study scheme, see *H.A.*, 23: 1434.]

3424. WESTERMARCK, N., AND LINDVALL, K.
Tutkimus puutarhaviljelyn tuotosta ja kustannuksesta malminkartanon opetus- ja koetilalla. (**On returns and costs of the Malmi Estate Garden.**) [English summary 1 p.]
Maataloust. Aikakausk., 1955, **27**: 9-40, bibl. 2.

Data are submitted on the economics of growing fruit, vegetables and ornamentals—the last two outdoors and under glass—on the experimental farm of Helsinki University. Tables and diagrams have detailed captions in English.

Atmospheric pollution.

(*See also* 3499a, b.)

3425. PESANTE, A.
Danni da sostanze tossiche emesse da stabilimenti industriali. (**Injuries from the toxic effluvia of industrial establishments.**)
Inf. fitopat., 1955, **5**: 42-50, illus.

After general introductory remarks on injury to plants due to atmospheric pollution the author discusses the chief factors affecting the extent of such damage, namely, atmospheric pressure, light, humidity and air currents. The symptoms are then described of injuries due to sulphur dioxide, fluorine, chlorine, ammonia, nitrous and tarry vapours and coal gas. The illustrations include colour plates.

3426. MIDDLETON, J. T.
Biological systems for the identification and distribution of air pollutants.
Pap. Amer. Soc. mech. Engnrs **55-APC-11**, 1955, pp. 6, bibl. 9, map.

While it is possible to determine the concentration of some air-polluting gases by instruments alone, others can only be measured accurately with the help of plant responses (test plants: Pinto beans). A map based on plant damage surveys shows the area of southern California affected by air pollution.

3427. WEDDING, R. T., AND ERICKSON, L. C.
Changes in the permeability of plant cells to $P^{32}O_4$ and water as a result of exposure to ozonated hexene (smog).
Amer. J. Bot., 1955, **42**: 570-5, bibl. 8.

Artificial smog resulted in a decrease in the permeability of the cells of Pinto bean leaves to radioactive phosphate when the plants were exposed to a mixture of 1 p.p.m. of ozone with an excess of 1-*n*-hexene for periods up to 3 hours. Longer exposures resulted in a reversal of this effect and increased the permeability of the leaf cells to phosphate. This increased permeability was associated with the appearance of visible smog damage on the leaves. Potato-tuber disks showed similar effects from smog on uptake of P^{32} from a buffer solution and on both uptake and loss of water over short periods of time. [Authors' summary.]—Univ. Calif. Citrus Exp. Stat., Riverside.

3428. BOBROV, R. A.
The leaf structure of *Poa annua* with observations on its smog sensitivity in Los Angeles county.
Amer. J. Bot., 1955, **42**: 467-74, bibl. 19, illus.

Annual bluegrass (*Poa annua* L.) is very sensitive to certain phytotoxic agents present in smog and might be useful as a bioassay indicator plant. In the field, the characteristic response to hydrocarbon-oxidation products is seen to be a tan spotting or transverse banding limited to the region between tip and midblade of susceptible leaves. This damage has been duplicated in the laboratory with synthetically-produced smog. Tissue damage is similar to that previously described in spinach, beets, oats and other plants. The cells which are initially and most seriously damaged are those surrounding the substomatal chambers. Chloroplasts disintegrate, plasmolysis follows, and ultimate total dehydration of damaged cells results in parts or all of the mesophyll tissue in affected areas becoming "mummified". In plants having a high specific sensitivity to smog damage is correlated with stomatal distribution and activity, volume of intercellular air space and age of cells. Localization of damage is related to the gradient of cellular differentiation from tip to base in the linear leaf; the sensitive region is limited to those cells which have just completed maximum expansion. [Author's summary.] [See also *H.A.*, 25: 2329.]—Los Angeles County Air Pollution Control District, and Univ. Calif., Los Angeles.

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* 21 Tothill Street, London, S.W.1.

3429. Noble, W. M.
Pattern of damage produced on vegetation by smog.
J. agric. Food Chem., 1955, **3**: 330-2, bibl. 15, illus.

A new method of smog diagnosis, based on the pattern of damage in relation to cell maturity, is described. A type of banding occurs in the same location on leaves of the same age. A distinct pattern of banding was observed in some form on all but one of 50 species studied following a single exposure to smog. The area damaged was that in which cellular differentiation had most recently occurred. Artificial fumigations with ozone mixed with petrol vapours or car exhaust fumes also produced these bands.—Los Angeles Co. Air Pollution Control Distr., Calif.

Bees and nectar.

3430. Rousseau, M.
Contrôle au rucher de l'effet des poudrages de toxaphène sur les abeilles. **(Apiary observations of the effect of toxaphene dusts on bees.)**
C.R. Acad. Agric. Fr., 1955, **41**: 393-4.

Applications of 2% toxaphene dust to rosemary plants in full bloom at 25 kg./ha. did not cause any apparent injury to bees.

3431. Thomas, W. D. E., and Glynne Jones, G. D.
The systemic properties of diethyl-*S*-2-(ethylthioethyl) phosphorothiolate (demeton-S) with reference to the contamination of nectar.
Ann. appl. Biol., 1955, **43**: 182-91, bibl. 12.

The fate of diethyl *S*-2-(ethylthioethyl) phosphorothiolate (demeton-S) in white mustard (*Brassica alba*), borage (*Borago officinalis*) and field beans (*Vicia faba*) has been followed over several weeks using the radioactive tracer technique. Radioassay of nectar samples from flowers which opened a few days after spraying showed that no unchanged demeton-S, but that small amounts of degradation products were present. The highest value for total radioactivity found in the nectar corresponded to 2·7 p.p.m. expressed as demeton-S. [From authors' summary.]—Long Ashton Res. Stat., Bristol, and Seale Hayne Agric. Coll., Newton Abbot.

3432. Shuel, R. W.
Weather and nectar secretion.
Canad. Bee J., 1954, **63** (1): 11-15, from abstr. in *Bee World*, 1955, **36**, No. 123/55.

Canadian attempts to correlate honey yields with weather have not, in general, demonstrated clear-cut or consistent relationships, and it is concluded that the effect of weather on nectar secretion can best be appreciated by considering its effects on the development of the plant. The factors of sunlight, rainfall, temperature, humidity and wind are discussed.—Ont. agric. Coll., Guelph.

Biochemistry.

(*See also* 3498a, y, 3499o, 4404.)

3433. Gehrke, C. W., Affsprung, H. E., and Lee, Y. C.
Direct ethylenediaminetetraacetate titration procedure for calcium in biological substances. Anion exchange separation of phosphate.
Res. Bull. Mo. agric. Exp. Stat. **570**, 1954, pp. 10, bibl. 19.

A description is given of a rapid and accurate anion-exchange separation/direct titration process well suited for the routine analysis of calcium in plant materials in which phosphate interferes with the titration.

3434. Bussman, A.
Ein Beitrag zur Bestimmung von Zink in Blatt- und Holzmaterial. **(A report on zinc determination in leaf and wood material [of apple trees].)** [French summary.]
Landw. Jb. Schweiz, 1955, **4** (n.s.): 365-81, bibl. 41.

Colorimetric with dithizon and polarographic in acid ash solution at low electrolytic concentration.—Wädenswil.

3435. Mavrodineanu, R., Sanford, W. W., and Hitchcock, A. E.
Use of fluorescence for the estimation of substances separated on paper by partition chromatography.
Contr. Boyce Thompson Inst., 1955, **18**: 167-72, bibl. 1.

An adaptation is described of the Photovolt densitometer which makes possible the measurement of fluorescence from substances separated on paper by partition chromatography. The equipment consists of an ultraviolet light source, an ultraviolet transmitting glass filter followed by a filter transmitting only in the visible spectrum, and a photomultiplier tube connected to a measuring unit. Using this apparatus fluorescence measurements of indole-3-acetic acid (IAA) and an unknown substance separated from tomato plant extracts were studied. A proportionality between amount of substance per chromatograph spot and fluorescence was found and the lower limit of IAA estimation was determined as approximately 0·5 μg. per spot. [Authors' summary.]

3436. Lundegårdh, H.
Spectrophotometrical determination of peroxidase in living roots.
Physiol. Plant., 1955, **8**: 84-94, bibl. 8.

The spectrum of the cyanide and fluoride complexes with peroxidase from horseradish was compared with corresponding spectra from living tissues. Quantitative determinations of the apparent volume concentration of peroxidase can be made from the bands in the green and red parts of the spectrum. [From author's summary.]

3437. DAVIES, D. D.
The oxidation of d-*iso*citrate by pea-seedling mitochondria.
J. exp. Bot., 1955, **6**: 212-21, bibl. 24.

An enzyme isolated from pea-seedling mitochondria catalysed the oxidative decarboxylation of d-*iso*citrate in the presence of manganese.—Univ. Sheffield.

3438. NAGANNA, B., VENUGOPAL, B., AND SRIPATHI, C. E.
Occurrence of alkaline pyrophosphatase in vegetable tissues.
Biochem. J., 1955, **60**: 224-5, bibl. 2.

Phosphatase and pyrophosphatase activities were determined at pH values of 5·3 and 8·7, with and without added $MgCl_2$, in the leaves, shoots, roots or bulbs of various plants, including french beans, cabbages, onions, radishes, carrots, plantains and coconuts. In addition to the already known acid phosphatase and acid pyrophosphatase, a potent alkaline pyrophosphatase, active only in the presence of added Mg, was found to be present in all the tissues tested. Green leaves were the richest sources of alkaline pyrophosphatase and also usually, but not in all cases, contained large amounts of acid pyrophosphatase. None of the plant tissues contained any alkaline phosphatase.—Dep. Chem., Madras vet. Coll

3439. LORD, K. A.
Esterase inhibition by organo-phosphorus residues, with some observations on possible effects on plant metabolism.
Ann. appl. Biol., 1955, **43**: 192-202, bibl. 9.

Assays of parts of bean plants that had been sprayed with demeton-S showed that anti-esterase activity was limited to the parts sprayed; tissues developed subsequent to spraying showed no such effects. Leaves sprayed about 2 months previously inhibited added choline esterase and showed reduced activity in hydrolysing phenyl acetate. There is some evidence that substances, possibly substrates in the plant enzyme systems affected, accumulate in treated leaves. [From author's summary.]—Rothamsted exp. Stat., Harpenden.

3440. HATTORI, S., AND SHIROYA, M.
Studies on the browning and blackening of plant tissues. (II) On the interaction of DOPA and a specific oxidase in the leaves of *Stizolobium hassjoo.* (III) Occurrence in the leaves of dahlia and several other plants of chlorogenic acid as the principal browning agent.
Physiol. Plant., 1955, **8**: 63-70, bibl. 6, and 358-69, bibl. 21.

It was previously reported [*Misc. Reps Res. Inst. nat. Resources*, 1950, No. 17/18, p. 163] that the glycoside aucubin was solely responsible for the blackening of injured or decaying tissue of *Aucuba japonica*. Subsequent paper-chromatographic tests have shown that blackening in *Stizolobium hassjoo* is apparently caused by the interaction of DOPA (3,4-dihydroxyphenylalanine) and its oxidase. Leaves of *Dahlia variabilis, Aralia cardata, Clematis paniculata, Cryptotaenia japonica, Ilex latifolia, Inula salicina, Spiraea japonica* var. *ovalifolia* and *Viburnum sargentii* contain chlorogenic acid which gives rise to a brown substance when subjected to oxidation by polyphenoloxidase. Dahlia, clematis and viburnum contain caffeic acid which is also oxidizable by this enzyme. Leaves of *Aucuba japonica* do not contain the oxidase, although they contain chlorogenic acid. Chemical changes on oxidation are described.

3441. PETROVSKAJA, T. P.
Change in nucleic acid content in blossom buds during dormancy. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1954, **99**: 475-8, bibl. 8, illus.

A study was made of the nucleic acid content in male catkins of birch and in blossom buds of lilac and 2 species of cherry. It was found that during dormancy the ribonucleic and desoxyribonucleic acid content in the buds is low. The synthesis of nucleic acids begins about the middle of winter and reaches its maximum at the beginning of spring growth.

3442. SIRAGUSA, N.
Il ricambio gassoso dei prodotti ortofrutticoli. Nota 1. Stato attuale delle conoscenze sui fenomeni biochimici che lo determinano. **(Gaseous exchange in horticultural products. Note 1. The present state of knowledge concerning the biochemical phenomena responsible.)** [English summary 2 lines.]
Ann, Sper. agrar., 1955, Vol. **9**, No. 4, Suppl. pp. lxix-lxxviii, bibl. 17.

This review, concerned with the tricarboxylic acids and their enzymes, is to be followed by a paper on the storage of horticultural products.

Physiology.

(*See also* 3498e, h, 3499c, r.)

3443. SKOK, J., AND SCULLY, N. J.
Characteristics and movement of the flowering stimulus from the induced leaf of *Xanthium.*
Bot. Gaz., 1954, **116**: 142-7, bibl. 14, illus.

Experiments were carried out with single-leaf *Xanthium* plants to determine (*a*) the time required for formation and translocation of the flowering stimulus from its site of synthesis, the leaf, and (*b*) the effect of light on its movement and lability. It was found that the substance moves out of the leaf shortly after it is formed, and under certain conditions a total period of about 24 hours is adequate for formation and translocation of sufficient amounts of the floral stimulus to induce the formation of floral primordia at the apical meristem. This flower-inducing substance is not destroyed by light while still in the leaf, and, in fact, the final effective amount normally does not move out of the leaf until the following light period. *Xanthium* can be induced to produce flower primordia by subjection to a long continuous dark period not followed by a light period, but a light period following the dark period greatly enhances flowering, presumably by its effect on hastening the movement of the flower-inducing substance out of the leaf to the terminal meristem.—Argonne nat. Lab., Lemont, Ill.

3444. Lockhart, J. A., and Hamner, K. C.
Effect of darkness and indoleacetic acid following exposure to short day on the floral response of *Xanthium*, a short-day plant.
Bot. Gaz., 1954, **116**: 133-42, bibl. 12.

It is reported that, when a second dark period immediately follows the inductive dark period responsible for flowering in *Xanthium*, the flowering response is reduced or completely inhibited. The effectiveness of the second dark period is proportional to its length. Even when the inductive dark period is long enough to give maximum flowering, the effectiveness of the second dark period is still pronounced. A large variation in the effectiveness of the second dark period is also reported; but, when the plants are treated with indoleacetic acid solution (50 mg./l.) at the beginning of the second dark period, the effectiveness of this period is greatly enhanced, and the variability in response is reduced. It is suggested that the second dark period and the IAA act either to destroy the flowering stimulus or to prevent intermediate reactions in the production of the stimulus. [Authors' summary.]—Univ. Calif., Los Angeles.

3445. Jennings, P. R., and Zuck, R. K.
The cotyledon in relation to photoperiodism in cocklebur.
Bot. Gaz., 1954, **116**: 199-200, bibl. 2.

No floral induction resulted from exposure of cotyledons of *Xanthium pennsylvanicum* to as many as 25 8-hour photoperiods while the rest of the plant received long photoperiods, in spite of the fact that the area of 2 average cotyledons is larger than the minimal area of foliage leaf required to induce flowering.—Drew Univ., Madison, N.J.

3446. Shimada, T.
The reversal of growth phase in higher plants. [Japanese, with English summary $\frac{3}{4}$ p.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951 [received 1955], **13**: 73-82, bibl. 19, illus.

By means of the artificial control of photoperiod, the author succeeded in inducing the reversal of growth phase, i.e. the retrogressive march of growing processes from the reproductive phase into the vegetative one, using a short-day plant, *Perilla frutescens* var. *crispa* Dcn. [From author's summary.]

3447. Roodenburg, J. W. M.
The physiological length of the photoperiod.
Reprinted from *Proc. 8th int. bot. Congr. 1954*, Paris, pp. 318-19.

The physiological length of a photoperiod is highly dependent on the spectral composition of the sort of light used. The physiological day length increases in the sequence: mercury, fluorescent, sodium, neon, and incandescent light. It is likely that, for most plant species, the photoperiodic action of sunlight lies between that of fluorescent and that of sodium light. [From author's summary.]

3448. Nederlandse Stichting voor Verlichtingskunde, Committee on Plant Irradiation.
The determination of the irradiance in various spectral regions for plant irradiation practice.
J. hort. Sci., 1955, **30**: 201-7, bibl. 3, illus.

In an earlier communication* the Dutch Committee on Plant Irradiation made proposals for the specification of the radiation of light sources used in installations for plant irradiation. It was suggested that lamps should be characterized by the values of the radiant flux in each of several spectral bands, and that the quantity of radiation in each band should be expressed in milliwatts p.sq.m.

In this second communication a procedure is outlined by means of which the suggested method can be applied in practice and the required data can be obtained. The data required for characterization of radiation are summarized as follows: "(1) The relative spectral distribution of energy of the light sources in their mountings in the wavelength region below 1 micron, to be supplied by the manufacturer or by a spectrophotometric laboratory. (2) The percentage of the total radiation from the light source emitted in the various spectral bands; these percentages can be computed from the spectral energy distribution curve. (3) The irradiance at the site of the plants (preferably in the wavelength region below 1 micron), to be measured by the user, for example with a photocell-microammeter combination. This instrument should be calibrated and checked by a laboratory that has access to an absolute bolometer or thermopile. Such a laboratory can provide a conversion factor for each light source; with the aid of this factor the meter readings may be converted into absolute units (mW/m^2). The data mentioned under (2) and (3) enable the user to determine the irradiance in each spectral band."

3449. Bosian, G., and Ensgraber, A.
Über die Vollautomatisierung der CO_2-Assimilationsbestimmung und zur Methodik des Küvettenklimas. **(On the fully automatic measurement of CO_2 assimilation and on methods of regulating the cuvette climate.)**
Planta, 1955, **45**: 470-92, bibl. 21, illus.

A description is given of apparatus used in the automatic measurement of the CO_2 gas exchange of plants in the field. Failure to cool the cuvette in which the leaf is placed was shown to result in an experimental error requiring correction, especially under conditions of high temperature and direct insolation.—Landes-Lehr- u. ForschAnst. f. Wein- u. Gartenbau, Neustadt a.d. Weinstrasse.

3450. Martos, L.
A sziklevelek elettani szerepéröl. **(On the physiological function of cotyledons.)** [Russian and English summaries 1 p. each.]
Növénytermelés, 1955, **4**: 97-108, bibl. 43, illus.

The removal of cotyledons from young bean seedlings (*Phaseolus vulgaris*) with green leaves caused growth to cease and finally caused death. Experiments showed that most of the ascorbic acid formed by the cotyledons was absorbed by the seedlings, which were also able to synthesise ascorbic acid. There were indications of a correlation between ascorbic acid synthesis and decomposition of sugars. Bean seedlings whose cotyledons had been removed contained more ascorbic acid (in fresh weight) in the epicotyl and leaves than the controls, showing that cessation of growth is not due to lack of ascorbic acid. Lateral roots did not develop on young seedlings deprived of their cotyledons, but normal lateral root formation was induced by grafting older (3-week-old) roots onto the collar of the seedlings. —Univ. Agric., Budapest.

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* Specification of radiant flux and radiant flux density in irradiation of plants with artificial light. *J. hort. Sci.*, 1953, 28: 171-84, bibl. 17. Also in Dutch in *Elektrotechniek*, 1951, 29: 467-70.

3451. Fries, N.
Further experiments on the response of decotylised pea seedlings to arginine.
Physiol. Plant., 1955, **8**: 164-73, bibl. 4.

A study was made of the growth-promoting effect of arginine on decotylised seedlings of *Pisum sativum* grown on an agar medium in the dark. Seedlings developed from small seeds responded in the same way to arginine and glycine as did seedlings from large seeds. The age of the seedling at decotylisation did not affect the strength of the response to arginine, unless the seedlings were more than 66 hours old. The nitrogen content was higher in those seedlings which had been cultivated with part of the nitrate exchanged for arginine. The changes in the protein and non-protein nitrogen content were followed during the early development of the seedlings grown with and without arginine. The results are discussed. It is considered that arginine serves as a particularly suitable material for protein synthesis in darkness. [From author's summary.] [For earlier work, see *H.A.*, 23: 3723.]—Inst. physiol. Bot., Univ. Uppsala.

3452. Šikula, J.
Stárnutí rostlin ve vztahu k regeneraci a k výživé. (**Senescence of plants in relation to regeneration and nutrition.**) [English and Russian summaries 1½ pp. each.]
Acta Univ. Agric. Silvic. Brno, Ser. A, 1954, No. 3, pp. 11-61, bibl. 46, illus.

The effect of certain microelements, growth substances and light treatments on the growth of *Sedum purpureum*, *Bryophyllum crenatum* and 4 other species during the late stages of development was studied under controlled conditions. Zn and Mn prolonged the blossoming period and hastened the development of leaf rosettes. The stimulating effect of B was less pronounced; it inhibited blossoming but encouraged leaf development. Cu and Zn encouraged the development of flower primordia. β-indoleacetic acid increased and 2,3,5-triiodobenzoic acid retarded root initiation, the former also having a rejuvenating effect on the plant and the latter hastening development. The trace elements, especially Cu, and the growth substances increased root formation at all nodes. The senescence of plants can be temporarily stopped and some degree of rejuvenescence induced by favourable growing conditions, increased moisture or certain traumatic treatments. The results are discussed in relation to propagation by cuttings.

3453. Champagnat, P.
Les corrélations sur le rameau d'un an des végétaux ligneux. (**The relationships existing between side shoots on one-year-old branches of woody plants.**) [Spanish summary ¾ p.]
Phyton, 1954, **4**: 1-102, bibl. 181, illus.

Branching in one-year-old shoots of woody plants is governed by 2 factors: (1) an inherent character in the buds themselves predetermining the vigour of the shoots and depending on their position of insertion, (2) an inhibitory mechanism differing from the auxin mechanism. The interaction of these 2 factors in acropetalous and basipetalous species and the effects of pruning are discussed. The plants studied included *Sambucus nigra*, *Prunus padus*, *Syringa vulgaris* and *Cornus sanguinea*.—Fac. Sci. Clermont-Ferrand, France.

3454. Farkas, G. L., and Rajháthy, T.
Untersuchungen über die xeromorphischen Gradienten einiger Kulturpflanzen. (**Studies on xeromorphic gradients in some cultivated plants.**)
Planta, 1955, **45**: 535-48, bibl. 21.

It has been suggested that the upper leaves of plants, as a result of insufficient water supply, have a more pronounced xeromorphic structure than the lower ones. A study of the xeromorphic gradients in tomatoes, among other cultivated plants, confirmed this hypothesis and showed that a close relationship exists between the size of leaf epidermis cells and the number of stomata. The degree of xeromorphy reflected in these two characteristics was found to be determined by the position of the leaf on the stem, independent of leaf size. Gradients of physiological and chemical leaf properties such as water content, water deficit, chlorophyll content and ascorbic acid content were also studied.

3455. Scott, B. I. H., McAulay, A. L., and Jeyes, P.
Correlation between the electric current generated by a bean root growing in water and the rate of elongation of the root.
Aust. J. biol. Sci., 1955, **8**: 36-46, bibl. 7, illus.

Methods of measurement of the electric fields produced by plants have been developed which eliminate artefacts commonly present in such investigations. The normal potential pattern in the water surrounding actively growing bean [*Vicia faba*] roots is described. When rates of elongation of roots are controlled by two methods which produce very different types of overall metabolic change, the potential pattern is shown to be correlated with the rate of elongation. Values are given of the electric power dissipated in water in which a bean root is growing, and of the current generated by the root in the water. [Authors' summary.]—Dep. Phys., Univ. Tasmania.

Growth substances.

(*See also* 3435, 3444, 3482, 3498 l, p, w, 3528, 3559-3566, 3643, 3672, 3676, Weeds and weed control section, 3908, 3987, 3988, 4005, 4029, 4127, 4243, 4244, 4253, 4256, 4261, 4262, 4289, 4356, 4417, 4457, 4483.)

3456. Kelso, J. M., and Turner, J. S.
Protoplasmic streaming in *Tradescantia*. I. The effects of indoleacetic acid and other growth-promoting substances on streaming.
Aust. J. biol. Sci., 1955, **8**: 19-35, bibl. 20, illus.

The rate of protoplasmic streaming in the staminal hair-cells of *Tradescantia virginiana* is not affected by change of oxygen concentration in a hanging drop enclosing the hairs over the range 1·5–100% of oxygen in the surrounding gas phase. This allows experiments to be carried out without continuous renewal of the water drop. Over the physiological range of concentrations, IAA, IBA, NAA and 2,4-D all modify the rate of protoplasmic streaming in these cells. These substances, added alone, bring about changes in the rate of streaming within 10 min.; maximum effects are reached in 30 min., and the rates return to normal in 60–70 min. (exceptions to this rule are noted for NAA (high concentrations) and 2,4-D (low concentrations)). Low concentrations of the auxins stimulate the streaming, high concentrations depress the rate, and intermediate concentrations are without effect. The auxins thus affect streaming much as they do the growth of stems, and the optimal concentrations for stimulation are similar for both processes. The "total effect" (T.E.) for each growth substance may be estimated as the total extra or diminished distance travelled by a protoplasmic particle in the presence of the applied substance. The maximum positive T.E. is given at 1 mg./l. (1 p.p.m.) for IAA and IBA, and at 5 mg./l. for NAA. There is a marked pH effect for the reaction of streaming to IAA; increase in pH renders the applied solution much less effective over the whole range of concentration. The temporary effects of IAA on streaming, both stimulation and inhibition, are stabilized, near their maximal values, if fructose or malic acid are added with the auxin. These results largely confirm those obtained by Thimann and Sweeney for the *Avena* coleoptile, except that the concentration for IAA giving maximal T.E. for *Avena* is as low as 0·01 mg./l. Moreover, for *Avena*, malic acid not only stabilizes the auxin effect but alters the threshold of response. An improved apparatus is described for measuring the rate of protoplasmic streaming in cells. [From authors' summary.]—Bot. School, Univ. Melbourne.

3457. Chakravarti, S. C., and Pillai, V. N. K.
Studies in auxin-vernalization relationships. I. The effects of certain synthetic auxins and their antagonists on the vernalization of *Brassica campestris* L. [Spanish summary 1 p.]
Phyton, 1955, **5**: 1-17, bibl. 35.

Pre-vernalization treatment of seeds with IAA, IBA and NAA advanced flowering and with 2,4-D and TIBA retarded it. Pre-sowing treatment of vernalized seeds with each of the above-mentioned chemicals (but not with coumarin) delayed flowering. Spraying vernalized and unvernalized seedlings with auxins and TIBA generally advanced flowering.

3458. Perlis, I. B.
Auxin and antiauxin-induced changes in the utilization of C^{14} labelled acetate and pyruvate by plant tissues.
Diss. Abstr., 1955, **15**: 20, being *Publ.* 10531 of 98 pp.

The effects of IAA and TCA (transcinnamic acid) on the utilization of acetate-1-C^{14} by pea stems were studied. Malic acid and water-insoluble protein syntheses were improved after IAA application. All cell wall components showed lower activities after IAA treatment. TCA inhibited acetate entry into malic acid and into polyuronide hemicelluloses, while stimulating its incorporation into cellulose and non-cellulose polysaccharides.

3459. Kehr, A. E.
Tumor induction on *Nicotiana* species by use of coconut milk and yeast extract.
Science, 1955, **121**: 869-70, bibl. 7, illus.

Seeds of *Nicotiana glauca* and *N. alata* were germinated and grown in sterile culture on the basal tobacco medium of Hildebrandt and Riker [*H.A.*, 17: 809], with supplements of coconut milk, yeast extract or malt extract. In no instance did tumours develop on either species grown on the mineral media without supplements or on media with only malt extract added, Tumours appeared more or less consistently, however, on seedlings growing on media that contained coconut milk, yeast extract, or combinations of these with malt extract. The tumours appeared to arise from the stem base and did not affect the roots. Further tests showed that a growth regulator in the medium was not essential for initiation of the tumours. Tests were also made with the amphidiploid *N. glauca-langsdorffii*. It is concluded that the plant extracts used not only have a tumour-inducing potential on the normal diploid species but also have a stimulatory action on the natural tumour growth of the amphidiploid species. It is suggested that the technique outlined may be useful as a biological assay for isolating the growth-promoting components of coconut milk and yeast extract.—Iowa St. Coll., Ames.

3460. Blackman, G. E., and Robertson-Cuninghame, R. C.
Interrelationships between light intensity and the physiological effects of 2:4-dichlorophenoxyacetic acid on the growth of *Helianthus annuus*.
J. exp. Bot., 1955, **6**: 177-211, bibl. 25.

Changes in seedling growth rate of *Helianthus annuus*, induced by sub-lethal amounts of growth regulator, were not greatly modified by the level of light between 0·25 and full daylight. The concentration of 2,4-D causing 50% mortality in shaded plants (0·12 daylight) was one-tenth of that required for plants in full daylight. With less phytotoxic amounts of growth regulator the intensity of shade before rather than after application was important for the changes in growth induced. Using a labelled 2,4-D salt it was shown that its penetration rate was accelerated by high light intensity after application.—Univ. Oxford.

3461. Norman, A. G.
Effect of isonicotinic acid hydrazide on some plant systems.
Science, 1955, **121**: 834, bibl. 6.

Recent work with isonicotinic hydrazide (INH) is discussed. From work on seedlings and young plants it appears that INH has physiological potency in the inhibition of root growth and development at levels substantially below those stimulating any morphological response from the tops of established plants.

3462. Bustinza, F., and Calvo Santamaría, M. L.
Nota preliminar sobre la actividad fitotóxica de la hidracida del ácido isonicotínico. (Preliminary note on the phytotoxicity of isonicotinic acid hydrazide.) [English summary ½ p.]
An. Jard. bot. Madrid, 1952 [received 1955], **11** (1): 1-17, bibl. 7, illus.

Isonicotinic acid hydrazide at a concentration of 1 in 250 in water inhibits germination of radish, and at 1 in 5,000 delays the growth of the radicle and plumule.

3463. Hay, R. E., and Uhl, D. P.
Response of certain plant species to an acrylic acid derivative.
Bot. Gaz., 1954, **116**: 193-5, bibl. 1, illus.

Seedling plants of tomato, radish, soya bean and sunflower were sprayed with 0·05, 0·1, 0·2 or 0·4% α-cyano-β (2,4-dichlorophenyl) acrylic acid in a 1% solution of Tween-20. The chemical inhibited growth in all 4 species, the degree of inhibition increasing with concentration. Further preliminary experiments with tomatoes did not show any fruit injury due to treatment. When used on dwarf marigold (*Tagetes tatula*) plants, when the initial flower buds were first visible, the chemical resulted in a delay in flowering rather than a suppression of vegetative growth. A 0·4% concentration delayed flowering by an average of 12 days. The form and colour of inflorescences were not affected by treatment. A study of several related compounds suggested that the diethanolamine salt was the most effective in retarding the growth of tomato plants. The responses noted are considered sufficient to warrant further investigation of this group of growth inhibitors. —Battelle Memorial Inst., Columbus, Ohio.

3464. Barlow, H. W. B., Hancock, C. R., and Lacey, H. J.
Some observations on growth inhibitors extracted from woody shoots.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 115-21, bibl. 4, illus.

The assay of growth substances by a "coleoptile straight growth" method was described in an earlier paper [*H.A.*, 23: 2466]. The method has since been modified slightly, in particular wheat replacing oat coleoptiles. Preliminary studies are reported on growth inhibitors extracted from shoots of a plum and an apple rootstock. The inhibitory effect of these substances was found to be proportional to the logarithm of the concentration, either alone or in the presence of IAA. Whereas a solution, which has been growth-promoting when first tested, loses this property when retested with fresh coleoptile sections, an inhibitory solution retained its property through at least 3 successive tests. The inhibitors studied were also heat stable. When coleoptile sections, which had been inhibited for a period of about 20 hours, were transferred to water or IAA solutions they were still capable of considerable growth, the extent of the response being directly related to the degree of initial inhibition.

Tissue culture.

3465. Street, H. E.
Factors controlling meristematic activity in excised roots. VI. Effects of various "antiauxins" on the growth and survival of excised roots of *Lycopersicum esculentum*, Mill.
Physiol. Plant., 1955, **8**: 48-62, bibl. 11.

(1) When tested over a wide range of concentrations 2,3,5-triiodobenzoic acid (TIBA), α-(parachlorophenoxy)-isobutyric acid (PCIB), phenoxy-cyclo-propane carboxylic acid (PCPC) and 2-naphthoxyacetic acid (2-NOA) did not exert effects on excised tomato root growth similar to those obtained with α-(1-naphthylmethylsulphide)-propionic acid (NMSP). TIBA and 2-NOA resembled in action β-indolylacetic acid (IAA) rather than NMSP. PCIB stimulated main axis elongation in 2% sucrose medium, but no similar effect was observed at higher sucrose concentration. The concentration at which main axis growth was inhibited by PCIB was unaffected by the sucrose concentration; even at inhibitory concentrations it did not significantly affect the survival of roots subcultured in 3% sucrose medium. Sensitivity to PCIB appeared to decrease with time. No growth stimulation was obtained with PCPC and it was much more toxic than PCIB. (2) 1-naphthoxyacetic acid (1-NOA) stimulated the growth of roots cultured in 3% sucrose medium. There was a shift in the response curve to higher concentrations of 1-NOA resulting from increasing the sucrose concentration of the medium. 1-NOA markedly enhanced survival of roots repeatedly subcultured. It had similar effects on growth, root morphology and survival to NMSP. (3) 1-naphthaleneacetic acid (1-NAA) inhibited excised root growth and, like IAA, had a deleterious effect upon survival. Low concentrations of 1-NAA applied to roots repeatedly subcultured in 2% sucrose medium caused an acceleration of "ageing". Concentrations initially without effect on growth not only depressed survival but became progressively more inhibitory during repeated subculture. By contrast IAA does not show a similar cumulative effect at low concentrations. NMSP and 1-NOA did not show any significant interaction with IAA, but both exhibited a strong anti-auxin effect when tested against roots inhibited by 1-NAA. [Author's summary.]—Dep. Bot., Univ. Manchester.

3466. Boll, W. G.
Effect of sucrose concentration, length of passage, minor element nutrition, and pH value on growth of excised tomato roots.
Bot. Gaz., 1954, **116**: 156-62, bibl. 11.

With the clone of excised tomato roots studied here it was found that concentration of sucrose affected growth in length of main axis, production and growth of laterals, wet weight, dry weight, and percentage dry matter. The most satisfactory growth was obtained in medium containing 1·5% sucrose and using a 4-day segment-passage alternating with a 6-day tip-passage. The chelate ferric sodium ethylene diamine tetraacetate, under certain conditions, was not detrimental to growth. Using this chelate, satisfactory growth was obtained at pH levels above 5·0 (75% of control at pH 6·8). Growth responses were obtained on addition of either copper or molybdenum to the standard medium. Data are presented which suggest an "antagonistic" effect between copper and molybdenum. [Author's summary.]—Univ. Texas, Austin, and Clayton Foundation for Research.

Seeds and seed treatment.

(*See also* 3412, 3906, 3996, 4071-4073, 4454, 4487u.)

3467. Pasquini, D.
Ricerche intorno all'influenza dell'aria compressa sulla germinazione dei semi di alcune piante coltivate. (**Studies on the effect of compressed air on the germination of the seeds of certain cultivated plants.**) [English summary ½ p.]
Ann. Sper. agrar., 1955, **9**: 683-708, bibl. 83, illus.

In tests with seeds totally immersed in water a pressure of 7 atmospheres for 12 hours increased water absorption in most of the vegetable species tested, reduced percentage and speed of germination in spinach and pea, and reduced speed but not percentage of germination in *Vicia sativa.* A pressure of 5 atmospheres for 7 days killed the apical meristem in broad bean seedlings but did not affect laterals; cytological effects are also discussed.—Staz. agrar. sper., Modena.

3468. Evenari, M., Neumann, G., and Klein, S.
The influence of red and infrared light on the respiration of photoblastic seeds.
Physiol. Plant., 1955, **8**: 33-47, bibl. 14.

The effects of germination-stimulating red light and germination-inhibiting infrared light were studied in photoblastic lettuce seeds var. Grand Rapids after different periods of storage. The following results were obtained: (*a*) *After a shorter period of storage:* The Q_{O_2} and Q_{CO_2} [Q=ml. absorbed or evolved gas per 100 mg. air-dry seeds per hour] (1) of infrared-light-treated seeds were almost identical with those of seeds kept in darkness, (2) were significantly higher in red-light-treated seed till root emergence began than in seeds kept in darkness, and (3) were highest in decoated seeds kept in darkness. Time curves of respiration rates show more or less the same pattern in all treatments. RQ's [respiration quotient] remained at the same level and no significant difference could be found between those of seeds under different treatments. (*b*) *After a longer period of storage:* The effect of red and infrared light on respiration altered, as red light raises Q_{CO_2} in comparison with darkness, whereas infrared light lowers Q_{O_2}. Seeds exposed first to red and afterwards to infrared light have rates intermediate between those of seeds treated only with red or infrared light. The time curves of respiration rates differ from those after short periods of storage. The RQ's do not remain at the same level and there are differences between those of different treatments. It is suggested that in young seeds a respirational block exists which may be responsible for the germination behaviour of light-sensitive seeds in darkness. This block may be overcome to various degrees by red light, by storage or by decoating the seeds. [From authors' summary.]—Dep. Bot., Hebrew Univ., Jerusalem.

3469. Levari, R.
The effect of 2,4-D and coumarin on respiration of germinating wheat and lettuce seeds. [Hebrew summary.]
Palest. J. Bot. (*J*), 1953, **6**: 47-59, bibl. 13.

The respiration of lettuce seeds in water, 2,4-D, and coumarin was studied at concentrations which inhibited germination. There were 3 phases in respiration, which were separated according to increase in intensity. The first phase lasted for 8–10 hours during which respiration was greatly increased. In the following phase respiration was suspended, and even showed some decrease. The third phase was characterized by a steep rise in respiration after this minimum. Coumarin stimulated respiration at first and then inhibited it; 2,4-D first inhibited respiration and then stimulated it. —Dep. Bot., Hebrew Univ., Jerusalem.

3470. Poljakoff-Mayber, A.
Germination inhibitors and plant enzyme systems. II. Dehydrogenases. [Hebrew summary.]
Palest. J. Bot. (*J*), 1953, **6**: 60-6, bibl. 9.

Germinating lettuce seeds (var. Grand Rapids) at root emergence exhibited a "hydrogen donor-dehydrogenase" system, which was lacking in earlier stages of germination. Substances (plant acids) tested were not effective in stimulating this process before the 15th hour after germination. The seedling radicle possessed the highest dehydrogenase activity. Coumarin and thiourea had no effect on the "hydrogen donor-dehydrogenase" system *in vitro*. *In vivo* coumarin inhibited germination and so prevented the seeds from reaching the stage at which the system functions; thiourea had no effect.—Dep. Bot., Hebrew Univ., Jerusalem.

3471. Poljakoff-Mayber, A., and Mayer, A. M.
Some quantitative changes in the fat metabolism of germinating lettuce seeds and their inhibition by coumarin.
J. exp. Bot., 1955, **6**: 287-92, bibl. 12.

The fat reserve of Grand Rapids and Progress lettuce seeds was found to be an unsaturated lipid. Fat hydrolysis was blocked in both varieties by coumarin, while thiourea showed no effect. No free volatile saturated fatty acids were detected.—Hebrew Univ., Jerusalem.

3472. v. Sengbusch, R.
Die Erhaltung der Keimfähigkeit von Samen bei tiefen Temperaturen. (**Low temperatures for preserving the germination capacity of seed.**)
Züchter, 1955, **25**: 168-9, bibl. 4.

After 5 years of storage at −20° C. untreated onion seed with an initial water content of 12% had lost none of its germinating capacity. Similar results were obtained with rye, hemp and sugar beet seed.—Max-Planck Inst. f. Züchtungsforsch. (Erwin Baur Inst.), Hamburg-Volksdorf.

3473. Anon.
New machine for seed lab.
N.J. Agric., 1955, **37** (2): 9, illus.

A laboratory-size, air-flotation type of machine for separating certain lots of seed into heavy, medium and light-weight samples has been installed at the New Jersey Agricultural Experiment Station. It is proposed to study relationships that may exist between the weight of vegetable and other seed and germination capacity. The machine is briefly described and illustrated.

3474. Jaenichen, H., and Heimann, M.
Untersuchungen über eine Anwendungsmöglichkeit des Ultraschalls in der Phytotherapie (Ultraschallbehandlung zur Abtötung parasitischer Pilze und Bakterien im Innern von Samen, Früchten und Fruchtständen.) **(Studies on the possible application of ultrasonics in phytotherapy. Ultrasonic vibrations to kill parasitic fungi and bacteria in the interior of seeds, fruits and fructifications.)**
Phytopath. Z., 1955, **23**: 419-62, bibl. 54, illus.

A method was evolved which made it possible to kill *Bacterium michiganense* spores by ultrasonic radiation both *in vitro* and *in vivo*. In the latter case the lethal dosage was so high that it proved phytotoxic. This difficulty was circumvented by applying a seed disinfectant (8-oxyquinolinesulphate) simultaneously with ultrasonic radiation, which increases the permeability of the seed to the chemical. The combined treatment killed the pathogen within the seed and tomato yields were thereby increased by 29–41%. An addition of indoleacetic acid to the seed disinfectant was found to stimulate germination and seedling growth. Experiments on the control of various fungi in beet seed were equally successful, and it is believed that the combined chemical-ultrasonic technique of seed treatment is applicable also to other crops. Methods, dosages and responses of plants and pathogens are discussed in detail.—Tech. Hochschule, Hannover.

3475. Bruhin, A.
Über die polyploidisierende Wirkung eines Samenbeizmittels. **(On the polyploidizing action of a seed disinfectant.)**
Phytopath. Z., 1955, **23**: 381-94, bibl. 20, illus.

The fungicide Agrimax M (phenyl-Hg-dinaphthylmethanedisulphonate) was shown to polyploidize the root tips of the test plant *Crepis capillaris* when used as a seed disinfectant. The action of the chemical is similar to colchicine though it is apparently less phytotoxic.

Nutrition.

(*See also* 3498b-d, 3499e, p, 3681-3692, 4452, 4455.)

3476. Berezova, E. F., and others.
Composts enriched with nitrogen. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1955, **20** (4): 22-7, illus.

In peat composted with F.Y.M. the rate of nitrogen fixation was increased. It was found that tomato and early cabbage plants raised in nutrient blocks made of composted peat grew better and produced higher and earlier yields than those raised in blocks made of uncomposted mixtures of the same materials or made of a standard nutrient block mixture. Of the materials and rates tested for composting with peat, the following gave the best results: 20% dung (horse or cow), 5% chaff, 2% superphosphate and 2·5% lime tuff.

3477. Anon.
Soil measuring device uses tough nylon cup.
Agric. Newsl., 1955, **23**: 46-7, illus.

An account is given of an instrument developed in New Jersey for measuring soil fertilizer content by electrical conductivity. The instrument consists of a portable conductivity bridge and a cup of Zytel nylon resin for holding the soil sample. Since water content and temperature affect the measured resistance, the water content is uniformly adjusted to saturation point and the temperature measured, a correction being applied from tables. The method is rapid, accurate and convenient.

3478. Nielsen, B. F.
Den kemiske planteanalyse. **(Chemical plant analysis.)** [English summary 20 lines.]
Horticultura, 1955, **9**: 105-10, bibl. 8.

The interpretation of plant analysis depends on the knowledge of the form of the yield curve. It is claimed by Plesner and Steenbjerg that the yield curve must be S-shaped instead of following Mitscherlich's formula. The consequence of this will in the first place be that the plant analysis—expressed in terms of relative nutrient content—is capable of more than one interpretation in relation to the dry matter production and, further, that the use of standard values and critical limits as regards the relative nutrient content in the plant will be of no help in interpreting the plant analysis. A sound interpretation will only be possible when it is known to which part of the yield curve the results of the plant analysis refer. The "spot analysis"—including the quantitative analyses of various nutrient media in connexion with yield measurements—is described. [Author's summary.] [See also *H.A.*, 23: 360.]

3479. Hylmö, B.
Passive components in the ion absorption of the plant. I. The zonal ion and water absorption in Brouwer's experiments.
Physiol. Plant., 1955, **8**: 433-49, bibl. 28.

A revision is made of Brouwer's data on the zonal water and ion uptake of the broad bean root. The plant's chloride uptake is shown to be of a complex nature. When the metabolism of the root is artificially disturbed a part of the ion uptake is inhibited. The residual ion uptake is directly proportional to the water passage, indicating that the ions are passively transported through the root in mass flow with the transpiration stream. The passive ion component is directly proportional to the water passage, both when the same root zone is observed with different suction pressures and when different zones are compared with each other under the same suction pressure. On the other hand, the apical zones exhibit a higher active component of ion uptake repressible by inhibitors than the basal zones. Even the active ion component is partly dependent on the water flow. In experiments with the addition of sucrose to the medium the water flow could be greatly limited through osmotic counter-pressure without a corresponding inhibition of the ion uptake. In many series, however, the sucrose addition appreciably enhanced the total ion uptake of the strongly deficient plants. For this reason the sucrose must be assumed to increase the metabolism of the root and the accumulation of ions by supplying energy. The addition of sucrose is not shown to affect the relationship between the water flow and the passive components in the ion uptake. Brouwer's conception of impulses from the shoot regulating the conductivity of the root for water and ions is rejected. The relationship between suction tension and water flow in the root zones is shown to agree instead with laws well known from animal tissues for flow through filters and ultrafilters. Brewig's equation referred to by Brouwer is shown to be a derivation of Hagen-Poiseuille's law. This law is demonstrated to be valid in the root, as in other ultrafilters, first at higher pressures after the fluid in all pores has been set in motion. Due to the fact that the xylem vessels in the root tip are not fully developed, the suction tension of the shoot during intensive transpiration is strongly reduced by pressure drop through friction. [From author's summary.]—Bot. Lab., Lund.

3480. Biddulph, O.
Studies of mineral nutrition by use of tracers.
Bot. Rev., 1955, **21**: 251-95, bibl. 223.

With regard to calcium, copper, iodine, iron, manganese, molybdenum, phosphorus, sodium, sulphur and zinc.

3481. Scelfo, C.
Sulla localizzazione dei microelementi nei vegetali. Ricerche eseguite sul boro e sul manganese. **(On the distribution of the minor elements in plants. Studies on boron and manganese.)** [English summary 2 lines.]
Ann. Sper. agrar., 1955, **9**: 901-9, bibl. 13.

In tests on mustard the addition of 1 and 10 mg. Mn and 0·5 mg. B per pot gave: (1) 14, 25 and 30 g. dry weight of vegetable matter per plant respectively compared with 25 g. in the control; (2) 2·5, 3·5 and 2·5 g. leaf ash respectively compared with 2·5 g. in the control; (3) 0·5, 0·5 and 1·5 g. stem ash respectively compared with 1·5 g. in the control; (4) leaf contents of 0·001 and 0·002 mg. Mn and 0·005 mg. B; and (5) stem contents of 0·0002 and 0·0002 mg. Mn and 0·006 mg. B.—Staz. chim.-agrar. sper., Torino.

3482. Gauch, H. G., and Dugger, W. M., Jr.
The physiological action of boron in higher plants: A review and interpretation.
Tech. Bull. Md agric. Exp. Stat. **A-80,** 1954, pp. 43, bibl. 333, from abstr. in *Agric. Lit. Refs Boron minor Elem.*, 1955, List No. 30, No. 64.

Fifteen postulated roles of boron are evaluated in the light of a recent theory of the action of boron in higher, green plants. According to this theory boron plays a specific role in the translocation of sugars, and as a consequence boron deficiency symptoms would be expected to develop at all growing points of a plant. At these loci a considerable quantity of sugar would be required in order to sustain both the high rate of growth and the high rate of respiration characteristic of growing points. Evidence is presented for a role of boron in the water relations of cells. The most thoroughly-documented, postulated role of boron is that it is involved in the reproduction of plants and the germination of pollen. There is evidence that there is a relationship between boron and plant hormones.

3483. Lunt, O. R., and Wallace, A.
Use of iron chelates.
Calif. Agric., 1955, **9** (6): 4.

Iron chelated with EDTA and related compounds has not generally proved efficient in correcting iron deficiency chlorosis of plants grown in calcareous soils in California, and the amounts needed per acre to obtain a response are too high to be economic for most crops. Among new chelating compounds under trial, one, an aromatic amine designated Fe138, appears to be especially promising in calcareous soils. It has corrected chlorosis in a number of plant species and is apparently less phytotoxic than EDTA.—Univ. Calif., Riverside.

Soil conditioners.

(*See also* 3910, 3911.)

3484. Wester, R. E.
Synthetic soil conditioners . . . effect on crop yield.
Agric. Chemls, 1955, **10** (8): 44-6, 99, bibl. 9, illus.

Field experiments with 3 synthetic soil conditioners were conducted on a fine-textured silt loam at Beltsville, Md, in 1953. The calcium salt of vinyl acetate and maleic acid (VAMA) and the sodium salt of hydrolysed polyacrylonitriles (HPAN), each at rates of 500 and 2,000 lb. p.a., and carboxymethylcellulose (CMC) at the rate of 2,500 lb. p.a., were used. VAMA and HPAN stabilized the soil aggregates for the entire growing season, caused no puddling and permitted water to penetrate the soil rapidly. CMC improved stability of soil aggregates at a depth of 1–3 in. but the surface inch of soil became puddled. Significant increases in growth and yields of tomatoes, lettuce, carrots and lima beans resulted from the use of VAMA and HPAN at 2,000 lb. p.a. The lower rate of application caused small and generally insignificant yield increases. The use of CMC did not affect crop yields. [See also *H.A.*, 24: 1125.]

3485. Alderfer, R. B., and Sharp, W. C.
Effects of Clarion Extract on the physical and chemical characteristics of the soil.
Progr. Rep. Pa agric. Exp. Stat. **133,** 1955, pp. 6, bibl. 5.

Clarion Extract is a by-product of wood pulp manufacture containing a high proportion of lignin. Its value as a soil stabilizer was compared with that of VAMA and HPAN in field and greenhouse tests on various soils planted with vegetables, vines and roses. The results showed that Clarion Extract markedly improved the physical condition of the soil; on silty clay loam it was more effective than HPAN in increasing water-stable aggregation, but was not so effective as VAMA. In some cases crop yields were significantly increased. The only deleterious effect observed was depletion of nitrogen, which can easily be corrected by adding more nitrogen. Application of Clarion Extract should precede planting by a few weeks in order to provide a suitable interval for soil organisms to decompose the less resistant materials in the mixture. Immediate and complete mixing is essential to prevent crusting when the material dries. Applications in excess of 5 tons per acre at a time should be avoided for this reason.

Irrigation.

(*See also* 3616f, 3663, 3913.)

3486. Smith, L. P.
Calculating irrigation needs.
Sci. Hort., 1952-54, **11**: 11-17, illus.

The author discusses the method of calculating irrigation needs of a crop from its estimated rate of evaporation. The evaporation rate is based on meteorological data (sunshine, mean temperature, mean air humidity, and mean wind speed). Using this method, estimates of soil moisture needs are more accurate than those based on direct soil moisture measurements. A planned deficit below field moisture capacity of ½ in. per month from April to September is suggested for most crops.

3487. Stower, J. S.
Irrigation by the spray-line system.
World Crops, 1955, **7**: 329-30, illus.

Subjects discussed are types of equipment for the vegetable and flower grower, mains systems, diameter of piping, and the erection and moving of the spray-line.

3488. Wilcox, J. C., and McDougald, J. M.
Water distribution patterns from rotary sprinklers.
Canad. J. agric. Sci., 1955, **35**: 217-28, bibl. 10.

Factors affecting the uniformity of distribution of water by rotating sprinklers were studied. Eight geometric curves of water distribution by sprinklers were selected. In addition, examples of such curves were selected from field tests for study. In all cases, various sprinkler spacings were assumed, both square and rectangular; the distribution of water between sprinklers was mapped; and the degree of uniformity of distribution within the areas studied was calculated. Conclusions reached were as follows: 1. The best type of distribution curve for general application is one showing a steady decrease in rate of water application from the sprinkler out toward the outer circumference of water throw. 2. The attainment of this type of curve does not of itself guarantee good water distribution. The uniformity coefficient and the range coefficient are suggested for evaluating the uniformity of distribution. 3. With square spacing of the sprinklers, the spacing should be not greater than 60% of the diameter of the throw. On the average, square spacing of the sprinklers gives more uniform water distribution than does rectangular spacing covering the same area. This applies only to a condition of little or no wind. [Authors' abstract.]—Exp. Stat., Summerland, B.C.

Glasshouses and frames.

(*See also* 3499g, k, l, n, 3904, 3907, 3942, 4023-4025, 4027, 4031, 4057, 4472.)

3489. Hauszer, K. T.
Neuerungen im Glashausbau. I u II. (**New development in glasshouse construction. I and II.**) [English, French and Spanish summaries.]
Mitt. Klosterneuberg. Ser. B, 1955, **5**: 99-110, bibl. 8, illus., and 163-76, bibl. 5, illus.

With special reference to ventilation, the use of galvanized zinc and light metals, mobile structures, plastic materials and heating.

3490. Lawrence, W. J. C.
Glasshouse design and management.
J. roy. hort. Soc., 1955, **80**: 358-65, illus.

Glasshouse structure, siting and shape are discussed in relation to solar radiation and their effect on glasshouse climate. Brief notes are also given on heating, ventilation, condensation and glasshouse size.

3491. (Lawrence, W. J. C.), and Shill, O. W. [Editor].
The principles of glasshouse design.
Sci. Hort., 1952-54, **11**: 163-70.

The influence of location and season on natural light and its importance to the glasshouse grower is discussed.

3492. Gloyne, R. W.
Temperature under glass.
Sci. Hort., 1952-54, **11**: 158-62.

The effects of a glass cover on the enclosed air and soil temperatures have been studied. Soil temperatures under glass are increased due to a restriction in loss of heat by turbulent diffusion in the air. Temperatures at a depth of 4 in. in the soil may be 3-4 weeks ahead of those in the open. The effect of a glass cover on minimum air temperatures during March and April were also studied; the average gain in air temperature under glass compared with that in the open was related to the amount of sunshine the previous day. In both cases gains were smaller when the soil was fully covered by the crop. The greatest differences in temperatures inside and outside glass occurred on sunny afternoons, and much exceeded corresponding values at night.—Agric. Branch, met. Office, Harrow, Middlesex.

3493. L'Ecole d'Horticulture de Grand-Manil.
Matières plastiques pour l'horticulture. (**Plastics for horticulture.**)
Bull. hort. Liège, 1955, **10**: 198-9.

Lettuces (May Queen) grown under glass and plastic were analysed after harvesting on 14 May. Plants grown under plastic had significantly higher percentages of dry weight and chlorophyll and a higher carotene content than plants grown under glass. Some plants were grown on for a further 10 days in direct sunlight before harvesting. Final analyses showed that the dry weight percentage of plants started under plastic remained above that of plants started under glass, but that chlorophyll and carotene contents were lower.

3494. B[unt], A. C., and L[awrence], W. J. C.
Balanced steaming of glasshouse soil.
John Innes Leafl. **14**, 1955, pp. 7, 1s.

A method for steam sterilizing glasshouse soils is described in which a high thermal efficiency is obtained with minimal labour costs. The steam should be passed into the soil at a rate of not more than 18 lb./ft.^{2}/hour. The full boiler output is balanced against the area to be steamed; a table is given of the correct soil temperature and total length of Hoddesdon pipe to be used with a range of boiler sizes. Balanced steaming has resulted in fuel savings of up to 30% when compared with high pressure steaming. [See also *H.A.*, 25: 1262.]

3495. BUNT, A. C.
Recent investigations into the use of steam for soil sterilisation.
Sci. Hort., 1952-54, **11**: 176-82, bibl. 4.

At the John Innes Institution a controlled rate of steam injection plus attention to soil moisture content has resulted in appreciable saving in fuel.

3496. SEIDEL, E.
Anleitung zur CO_2-Begasung von Gewächshauskulturen. (**Instructions on the application of CO_2 to glasshouse crops.**)
Dtsch. Gartenb., 1955, **2**: 160-1, bibl. 2.

In Germany CO_2 ice has become available for increasing CO_2 concentration in the glasshouse atmosphere. In view of the low price at which the product is offered its application in tomato houses was shown to increase net profits by DM 500–1,100 per 1,000 m². The dosages required for different types of greenhouse and the costs involved in the treatment are tabulated.

3497. KUKKONEN, A., AND KAILA, A.
Straw as a substitute for stable manure in hotbeds.
Acta Agric. Scand., 1955, **5**: 224-38, bibl. 4, illus.

Experiments in Finland, using cucumber, spinach, lettuce, parsley, and cyclamen as test plants, showed that it was possible largely to substitute wheat straw for horse manure in hot beds, provided they were prepared after mid-April. Only ⅓m³ hot horse manure was required per 15 m³ straw. No difference was found between the efficiency of urea and calcium cyanamide as a source of nitrogen.—Univ. Helsinki.

Noted.

3498.

a ANDRUS, S.
Determination of copper in plant materials by means of zinc dibenzyldithiocarbamate.
Analyst, 1955, **80**: 514-16, bibl. 5.

b ASKEW, H. O.
Biology and the trace elements.
Reprinted from *Trans. roy. Soc. N.Z.*, 1955, **84**: 871-91, bibl. 26.
A summary of some of the relations of trace elements to living matter.

c BEAR, F. E.
Iron chelates in agriculture.
Agric. Chemls, 1955, **10** (7): 34-5, 107, 109, illus.
A review.

d BENNE, E. J.
Report on zinc in plants.
J. Ass. off. agric. Chem. Wash., 1955, **38**: 403-5, bibl. 7.
The one-colour procedure of Zn determination described.

e BENNET-CLARK, T. A.
Water and plant growth.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 47-53.
A most readable review of fundamental aspects.

f BINNS, Sir B. O.
Plantations and other centrally operated estates.
FAO agric. Stud. **28,** 1955, pp. 41, bibl. 5.
One of a group of connected studies on land tenure and related subjects.

g BOULAY, H.
Quelques aspects de la production horticole du Roussillon et des problèmes qu'elle pose. (**Some aspects of the horticultural production of Roussillon and of its problems.**)
Ann. Soc. nat. Hort. France, 1955, **1**: 14-25, illus.
Intensive production of vines, fruit (particularly apricots), and early vegetables.

h BRUN, W. A.
Translocation of flowering effect in photoperiodically induced plants.
Diss. Abstr., 1955, **15**: 13-14, being *Publ.* 10455 of 104 pp.
In *Xanthium commune* and *Glycine max* (var. Biloxi).

i CHANDLER, W. H.
Cold resistance in horticultural plants: A review.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 552-72, bibl. 81.

j CHEN, K.-I., AND PASTO, J. K.
Facts on a century of agriculture in Pennsylvania 1839 to 1950.
Bull. Pa agric. Exp. Stat. **587,** 1955, pp. 85, bibl. 21.
Including statistics on market gardening and fruit crops.

k DOURNES, J.
Deuxième contribution à l'ethnobotanique indochinoise. Les plantes utiles des Sré. (**Second contribution to Indo-Chinese ethnobotany. The useful plants of Sré.**)
J. Agric. trop. Bot. appl., 1955, **2**: 64-86, bibl. 2.
Food, medicinal, industrial and other useful plants.

l EBERT, V. A.
Versuche über die quantitative Bestimmung der β-Indolylessigsäure (Heteroauxin) und ihre Lokalisierung im Gewebe der Pflanze. (**Experiments on the quantitative determination of β-indoleacetic acid (heteroauxin) and its accumulation in the plant tissue.**)
Phytopath. Z., 1955, **24**: 216-42, bibl. 61, illus.
By a fluorometrical method.

m ELLBRIDGE SUB-STATION (N.A.A.S.).
Station Guide Ellbridge Sub-station, 1955, Hatt, Saltash, pp. 11.
Notes on trials with flowers including bulb crops, vegetables and soft fruits.

n ESSER, K.
Pollen tubes in the style after chloral hydrate and aceto-carmine.
Stain Tech., 1955, **30**: 195-7, bibl. 2, illus.
Staining to distinguish pollen tubes from conducting tissues in the style.

o FAO.
The Agriculture Division of FAO. A summary of its organization, development and accomplishments from 2 December 1946 to 31 December 1954.
[*Publ.*] *FAO, Rome*, 1955, pp. 153.

p HALL, W. C., JOHNSON, S. P., AND LEINWEBER, C. L.
Amino triazole—a new abscission chemical and growth inhibitor.
Bull. Tex. agric. Exp. Stat. **789**, 1954, pp. 15, bibl. 23.
Tested on cotton as a defoliant.

q HANNIGAN, M. A.
Horticultural districts of Queensland. I. The granite belt.
Qd agric. J., 1955, **80**: 137-46, illus.
Apples, plums, peaches, grapes, tomatoes, beans and cabbages.

r HOLDEN, M., AND PIRIE, N. W.
The partial purification of leaf ribonuclease.
Biochem. J., 1955, **60**: 39-46, bibl. 20.
From pea seedlings.

s KIRTON (N.A.A.S.).
Guide to horticultural experiments, Kirton Experimental Husbandry Farm, 1955, Kirton, Boston, pp. 16.
Notes on trials with bulbs and vegetables.

t KLATZKIN, C.
Studies of the biosynthesis of nicotinamide by seed embryos during germination.
Biochem. J., 1955, **60**: viii, bibl. 1.
In embryos of runner bean seeds.

u KNOCH, K.
Neue Motor-Kleingeräte für Bodenbearbeitung im Wein-, Garten- und Obstbau. **(New small machines for cultivating the soil in vineyard, garden and orchard.)**
Techn. Landw., 1955, **7**: 353-4, illus.

v LEBEDEV, S. I.
The rôle of carotene in plants. [Russian.]
Priroda, 1955, **44** (6): 42-9, illus.
A discussion.

w LIBBERT, E.
Nachweis und chemische Trennung des Korrelationshemmstoffes und seiner Hemmstoffvorstufe. **(The determination and separation of the correlative growth inhibitor and its precursor.)**
Planta, 1955, **45**: 405-25, bibl. 22.
In ether extracts of pea plants.

x LUDDINGTON (N.A.A.S.).
Station Guide Luddington Experimental Horticulture Station, 1955, Stratford-on-Avon, pp. 17.
Notes on trials with top and soft fruits, vegetables, flowers and shelter screens.

y LÜDERS, R., AND HUSER, R.
Die photometrische Bestimmung von Kupfer, Molybdän und Titan in Pflanzen. **(The photometric determination of copper, molybdenum and titanium in plants.)** [English summary 5 lines.]
Landw. Forsch., 1955, **7**: 212-16, bibl. 9.

z MARSH, C. A.
Quercetin glucosiduronic acid from the French bean.
Nature, 1955, **176**: 176-7, bibl. 5.
In the leaf.

3499.

a MAVRODINEANU, R., AND COE, R. R.
Improved apparatus and procedures for sampling and analysing air for fluorides.
Contr. Boyce Thompson Inst., 1955, **18**: 173-80, bibl. 6, illus.
For the study of the effects of air-borne fluorides on plants.

b MAVRODINEANU, R., AND GWIRTSMAN, J.
Photoelectric end-point determination in the titration of fluorides with thorium nitrate.
Contr. Boyce Thompson Inst., 1955, **18**: 181-6, bibl. 8, illus.
An instrument for determination of fluorides in plant tissue and air.

c METZNER, H.
Veränderungen der Blattproteine bei photoperiodischer Induktion. **(Changes in leaf proteins under the influence of photoperiodic induction.)**
Planta, 1955, **45**: 493-534, bibl. numerous.
In *Kalanchoë blossfeldiana*.

d MINISTRY OF AGRICULTURE, N. IRELAND.
The Dutch lights system of culture.
Mon. agric. Rep. Minist. Agric. Belfast, 1955, **30**: 37-8, 69-72, 99-103.
Construction and cropping programmes with vegetables and flowers.

e MULDER, D.
Een enquête over sporenelemententekorten in de tuinbouw. **(An inquiry into trace element deficiencies in horticulture.)** [English summary 6 lines.]
Meded. Dir. Tuinb., 1955, **18**: 369-74, illus.
In the Netherlands.

f NAKABAYASHI, T.
Research on flavonoid pigments by the method of paper chromatography. [Japanese, with English summary 3 lines.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951 [received 1955], **13**: 154-8, bibl. 6.
In 38 species, including spinach, *Prunus* spp., rhododendron, magnolia, *Robinia*, tomato and *Ginkgo*.

g PIZER, N. H., AND PEARL, R. T.
The assessment of loams for John Innes composts.
Sci. Hort., 1952-54, **11**: 183-90.

h PREW, H. A.
Shelter for Auckland home gardens and orchards.
N.Z. J. Agric., 1955, **90**: 579-87, illus.
Establishment of hedges and lists of suitable trees and shrubs.

i PURVIS, E. R., AND OTHERS.
Fertilizer and lime recommendations for New Jersey.
Circ. N.J. agric. Exp. Stat. **568,** revised 1955, pp. 16.
Including vegetables and top and small fruit.

j RAY, P. K.
Crop insurance and the problems of its application to underdeveloped countries.
Mon. Bull. agric. Econ. FAO, 1955, **4** (6): 1-9.

k REINAU, E. H.
Düngung mit dem Nährgas Kohlensäure? **(Carbon dioxide gas as a fertilizer.)**
Dtsch. Gartenb., 1955, **2**: 158-9, illus.

l ROODENBURG, J. W. M.
Hedendaagse plantenbestraling. **(Present day use of plant irradiation.)**
Reprinted from *T.N.O.-Nieuws*, 1955, No. 108, pp. 108-12, bibl. 10, illus.
Types of apparatus used in irradiation of greenhouse plants. [See also *H.A.*, 25: 2342.]

m RUSSELL, E. W.
The maintenance of productivity in horticultural soils.
Sci. Hort., 1952-54, **11**: 1-10.

n SCHOLZ, H.
Ventilatorlüftung in Gewächshäusern. **(Fan ventilation of glasshouses.)**
Dtsch. Gartenb., 1955, **2**: 215-16, illus.
Successfully developed at Martin-Luther-Univ., Halle.

o SHOJI, K., AND NAKATA, S.
The rapid determination of potassium, calcium and magnesium in plant material by hydrogen flame spectrophotometry.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 299-306, bibl. 6.
At the University of Hawaii, using macadamia and banana leaves and sugar cane sheaths.

p ŠKOLJNIK, M. JA.
The biological rôle of boron. [Russian.]
Priroda, 1955, **44** (4): 89-94, illus.
A brief review of Soviet work.

q SPANGSBJERG.
Statens Forsøgsstation Spangsbjerg pr. Esbjerg. **(The Danish Research Station Spangsbjerg nr Esbjerg)**, undated, pp. 6, illus.
Notes on fruit, vegetable and ornamental research.

r UTRECHT, LABORATORIUM VOOR BELICHTINGSONDERZOEK IN DE TUINBOUW. (ROODENBURG, J. W. M.)
Nieuwe literatuur over toepassing van kunstlicht in de tuinbouw van 1950 af. **(New literature, since 1950, on the use of artificial light in horticulture.)**
[*Mimeo.*] *Lab. Belichtingsonderz. Tuinb. Utrecht*, 1954, pp. 15.
Covering the ground up till the end of 1953.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3412, 3423, 3424, 3498g, j, q, x, 3616a, c, h, k-m, 3617h, 3644, 4341, 4458, 4464, 4466, 4478, 4484, 4487o.)

3500. INGRAM, J.
Fruit section.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 7-20.

The 5-year planting programme for the establishment of the fruit plantations, covering 53½ acres, has now been finished. Progress reports are given on those trials where results are being obtained. They concern among other problems the control of red spider (*Tetranychus telarius*) on black currants, and of American gooseberry mildew (*Sphaerothecà morsuvae*). An account is given of the comparative costs per acre of establishing and maintaining various apple planting systems.

3501. CRAVENS, M. E., Jr., AND BERE, R. L.
Trends in the Ohio apple industry 1889-1953.
Res. Bull. Ohio agric. Exp. Stat. **756,** 1955, pp. 33+appendix, bibl. 22.

The number of bearing trees in Ohio has declined since 1920. Apple production has declined by about 83% since the 1911-14 crops. Average yields per bearing tree have increased from 1¼ bushels to 2¾ bushels.

3502. CRAVENS, M. E., Jr., AND BERE, R. L.
Trends in the Ohio peach industry 1900 to 1953.
Res. Bull. Ohio agric. Exp. Stat. **758,** 1955, pp. 45, bibl. 14.

Total production over the whole period has declined by 50%, but yields per acre have increased by about 75% since 1920.

3503. HOOS, S., AND FULLER, V.
Deciduous fruits. Trends and prospects as influenced by population and national income studied.
Calif. Agric., 1955, **9** (7): 2.

Deciduous fruit consumption in the U.S.A. in the post-war period has shown a tendency in customer preference for processed fruits rather than fresh fruit. Recent technological changes may have had considerable influence on consumer preference, and in future the processing industry may be revolutionized by cold pasteurization and sterilization by irradiation. Fresh fruit industries should also make full use of these new methods.

3504. Kühne, V. (Chairman).
L'économie fruitière aux Pays-Bas. Rapport de la commission d'étude de l'économie fruitière étrangère. **(The economics of fruit growing in the Netherlands. Report of the committee for the study of foreign fruit economics),** Berne, 1954, pp. 132, bibl. 14, illus.

In September 1953 the committee of the "Fruit Union suisse" of Zoug toured the main fruit-growing areas of the Netherlands to complete their study of the industry. The report is a collection of general considerations which are divided into 4 main sections: (i) fruit growing areas and methods; (ii) supply and demand; (iii) fruit packing and marketing; (iv) the structure of the industry.

3505. Baudewijn, P.
La culture fruitière. Analyse du travail, abaissement du prix de revient et types d'exploitation. **(Fruit culture. Analysis of labour, reduction of costs of production, and types of holding.)** [English and German summaries ¼ p. each.]
Rev. Agric. Brux., 1955, **8**: 725-65, bibl. 8, illus.

A detailed analysis is made of the costs of production, by seasons and by items, of 7 intensive apple and pear orchards in Belgium. Methods are discussed of reducing costs by suitable layout and mechanization and by increasing yields. It is concluded that the family holding, with a minimum area of 3 ha., is the most suitable type for intensive fruit culture.

Breeding and varieties.

(*See also* 3616i, t-w, y, 3617g, 4471, 4475.)

3506. Union Douanière Néerlando-Belgo-Luxembourgeoise, Brussels.
Listes nominatives de variétés de fruits et de sujets porte-greffes. **(List of varietal names of fruits and rootstocks.)** [French and Flemish texts], Brussels, 1955, pp. 58.

A decision has been made on the varietal names to be used officially in the 3 Benelux countries for the chief top and soft fruit varieties and rootstocks. The names are here listed, together with common synonyms.

3507. Maurer, K. J.
Apfelsortenkunde in der Baumschule. **(The identification of apple varieties in the nursery.)**
Gartenbauverlag M. & H. Schaper, Hanover, 1955, 8×5½ in., pp. 85, illus.

The vegetative characters of 38 apple varieties in the nursery stage are described and each is clearly illustrated by a series of photographs.

3508. Roby, F.
Las principales variedades de manzano cultivadas en Argentina. **(The chief varieties of apple grown in Argentina.)**
Rev. Invest. agric. B. Aires, 1955, **9**: 37-64, bibl. 20, illus.

The commercial apple varieties most widely grown in Argentina are Gravenstein, Jonathan, King David, Delicious, Winesap, Stayman Winesap, Rome Beauty, Huidobro and Granny Smith. Botanical descriptions are given of each, with notes on flowering and picking dates, results of pollination and cold storage trials and acceptance on domestic and foreign markets. Recommendations are made regarding the future scale of planting.

3509. Brooks, R. M., and Olmo, H. P.
Register of new fruit and nut varieties. List 9.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 535-49.

Short descriptions are given of new varieties originating in the U.S. as follows: 5 apples, 3 apricots, 4 avocadoes, 1 blackberry, 1 blueberry, 2 cherries, 5 grapes, 1 hican, 1 hickory, 2 limes, 1 mango, 6 nectarines, 29 peaches, 4 pears, 4 pecans, 7 plums, 2 raspberries, 13 strawberries, 1 tung, 3 walnuts. [See also *H.A.*, 25: 1284.]

3510. Anon.
New apple variety.
Amer. Fruit Gr, 1955, **75** (6): 31.

Wellington, introduced by the N.Y. Experiment Station, Geneva, resulted from a Cortland × Crimson Beauty cross. The fruit is early, large and red-streaked. It ripens evenly and will store for 1 month. It is not of high quality but is considerably better than Duchess and makes a satisfactory sauce.

3511. Dufour, A.
Orange-Suisse, variété nouvelle. **(Orange-Suisse, a new apple variety.)**
Rev. hort. suisse, 1955, **28**: 233-4.

The fruit of this apple variety, which is a hybrid of Ontario and Cox's Orange, can be stored until mid-February. The tree is of medium vigour and fruits regularly. The cross originated at Wädenswil.

3512. Tukey, L. D., and White, D. G.
The evaluation of apple color sports.
Fruit Var. hort. Dig., 1955, **10**: 13-14.

In 1950 five standard trees of Rome Beauty were each worked to 4 of its colour sports. Preliminary colour and storage tests were made in 1953. Under Pennsylvanian conditions Gallia Beauty proved an excellent red sport; the colour of Ohio Red Rome was not better than that of the standard variety. There were no differences in the storage quality of the 5 varieties at temperatures of 32–35° F. At 45° F. the redder sports seemed more susceptible to a disorder similar to Jonathan spot than less coloured sports.

3513. Dayton, D. F.
Breeding scab-resistant apples.
Trans. Ill. St. hort. Soc. for 1954, **88**: 122-5.

Encouraging results are reported from the co-operative project of the Illinois, Indiana and New Jersey Agricultural Experiment Stations. *Malus floribunda*, a selection of *M. pumila* and 15 other species have been used as sources of resistance, and it is expected that desirable types with commercial possibilities will appear in the present generation of seedlings.

3514. Brown, A. G.
Frost susceptibility of 2x and 4x Fertility pear.
A.R. John Innes hort. Instn 1954, 1955, p. 7.

Frost susceptibility of Fertility, a diploid, was compared with that of Improved Fertility, a diploid-tetraploid chimaera which behaves as a tetraploid. Heavy frost during the bud stage damaged styles on 64·5% of the flowers on Fertility compared with 99·4% on Improved Fertility. The latter, however, produced quite a good crop of parthenocarpic fruits.

3515. Gertych, Z.
Charakterystyka niektorych odmian sliw z kolekcji Kornickiej. (**Characteristics of some plum varieties in the Kornik collection.**) [English and Russian summaries ¾ and 1 p.]
Prace Zakł. Dendrol. Pomol. Kórniku, 1952, pp. 67-78, bibl. 12 [received 1955].

Notes are given on frost-resistant, good-quality, Polish plum hybrids and varieties. Damson, Victoria, Althan's Gage and Green Gage hybrids and some varieties bred by Micurin are singled out for special mention.

3516. Murawski, H., and Wieloch, E.
Türkische Pflaumen für den Anbau auf leichten Böden. (**Cherry plums for cultivation on light soils.**)
Dtsch. Gartenb., 1955, **2**: 162-5, bibl. 1, illus.

A description is given of several clones of cherry plum (*Prunus cerasifera*) which were bred and selected at Müncheberg; their cultivation on light soils is recommended. The suitability of the fruits for canning and jam-making is also discussed.

3517. Lapins, K. O., Mann, A. J., and Keane, F. W. L.
Progeny analysis of some apricot crosses.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 34.

The progeny of 13 controlled apricot crosses, in comparison with their respective parent varieties, showed: a tendency towards smaller fruit size; considerably less firmness of fruit; slightly better freedom of pit; and definitely lower fruit quality. Of the different varieties used in the crosses, the following affected their progeny favourably in the characteristics listed: Blenheim—fruit quality; Hemskirke—freedom of pit, fruit quality, fruit size; L-105 (McClure)—fruit quality, freedom of pit, fruit hardiness; Old Moorpark—fruit quality, fruit size; Perfection—fruit size, freedom of pit; Reliable—firmness of fruit, freedom of pit, frost hardiness; Tilton—fruit quality (but unfavourably in freedom of pit and fruit size). In breeding for frost hardy varieties with firm, high quality fruit, Reliable proved to be a very good parent when used in crosses with Old Moorpark or Hemskirke.—Canada Dep. Agric., Summerland.

3518. Grubb, N. H.
Cherry varieties: nomenclature and identification.
Sci. Hort., 1952-54, **11**: 46-52, bibl. 8.

The confusion existing among cherry varieties is discussed. Characteristics which may be used in variety identification are listed.

3519. Baldini, E.
Contributo allo studio delle cultivar di ciliegio della provincia di Firenze. II: Descrizione della coltura. (**Contribution to the study of the cherry varieties of the province of Florence. II. Description of the crop.**) [English, French and German summaries 10, 11 and 10 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 233-62, bibl. 129, illus.

Notes are given on the morphological, agronomic, biological and yield characters of 12 cherry varieties, which are classified into 3 groups according to their flowering date and 5 according to their fruiting date. All are self-sterile. Lists are given of the 6 varieties compatible with one another, the best pollinators for each variety, and the 6 best varieties.

3520. (Havis, A. L.)
Special peaches meet special purposes.
Agric. Res. Wash., 1955, **3** (12): 6.

New peach varieties are grouped in order of ripening, and their suitability for certain areas, in particular the southern U.S.A., is indicated.

3521. Johnston, S.
Sunhaven and Richhaven—new peach varieties.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 461-3, illus.

Sunhaven originated from the cross Redhaven × SH50; it matures 10 days earlier than Redhaven and 40 days earlier than Elberta. Fruits are medium large, nearly round, with a bright red skin colour over a golden ground. Flesh is clear yellow, of good flavour and very resistant to browning. The stone is free when fully ripe. It is not recommended as a canning peach. Richhaven originated from the same cross; it matures at the same time as Halehaven. The fruit is larger than that of Halehaven, brighter in colour, firmer and was rated highly in commercial canning tests. The stone is completely free and the flesh resists browning. Both new varieties were introduced by the Michigan Agricultural Experiment Station.

3522. Caillavet, H.
Nouvelles variétés de pêchers à l'étude. (**Study of new peach varieties.**)
Arboric. fruit., 1955, No. 13, pp. 2-4, No. 14, pp. 4-9, No. 15, pp. 13-14, No. 16, pp. 17-19, No. 17/18, pp. 4-9, bibl. 12, illus.

Short descriptive summaries are given of 129 peach varieties which have been introduced into France since 1940. They are arranged in 2 groups, in one maturity being related to that of Mayflower and in the other to that of J. H. Hale. An alphabetical list is also given in which those tolerating a fairly short dormant period and those resistant to winter cold are marked.

3523. Condit, I. J.
Fig varieties: a monograph.
Hilgardia, 1955, **23**: 323-538, bibl. pp. 13, plates 28.

Descriptions are given of many hundreds of fig varieties arranged in four groups, namely, the Caprifig, the Smyrna, the San Pedro and the Common. Keys are provided to assist in identifying varieties in the first and the last of these groups. Varieties and their synonyms are also listed alphabetically, and the fruits of many are illustrated. [The author of this monograph needs no introduction to anyone interested in figs. His detailed monograph is a most important contribution on fig varieties and should go far towards establishing their nomenclature on an orderly basis. It deserves to be re-issued as a book.—Ed.]

3524. Cicugin, J. V.
Sorbus **spp.—in orchards.** [Russian.]
Priroda, 1955, 44 (4): 108-10, illus.

Recommended hybrid varieties developed by Mičurin are: *Sorbus aronia*, *S.* [*aucuparia?*] × *Crataegus sanguinea*, *S. alpina*, *S. aronia* × *Mespilus germanica*. Others considered suitable for cultivation include *S. aucuparia* var. *moravica* and *S. aucuparia rossica.*

Propagation and rootstocks.

(*See also* 3409, 3410, 3464, 3616d, p, q, 3617a, 4477.)

3525. Mestichelli, C.
La germinabilità dei semi di *Morus alba* L. nei vari mesi dell'anno. **(Viability of the seeds of *Morus alba* in the different months of the year.)** [English summary 4 lines.]
Ann. Sper. agrar., 1955, **9**: 865-70, bibl. 8.

Wide variations were recorded in tests over 2 years but, in general, viability was highest shortly after harvesting. —Staz. sper. Gelsicolt. Bachicolt., Ascoli Piceno.

3526. Hatcher, E. S. J., and Garner, R. J.
The production of sphaeroblast shoots of apple for cuttings.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 73-5, bibl. 5, illus.

Sphaeroblasts were produced on the shy-rooting apple rootstock Malling Crab C by pruning and completely disbudding maiden and 2-year-old nursery trees. The best production of sphaeroblasts and of shoots on sphaeroblasts occurred when disbudding was done towards the end of the dormant season, but not later than March. Severity of pruning and age of tree had only a limited effect on sphaeroblast production. By the second season the sphaeroblast shoots had made sufficient growth to yield some 25 hardwood cuttings per tree. [For work on the rooting capacity of sphaeroblast shoots, see *H.A.*, 23: 2575.]

3527. Way, D. W., Hatcher, E. S. J., and Garner, R. J.
Aspects of rootstock propagation. III. Experiments with root cuttings.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 67-72, bibl. 13.

Root cuttings of the apple rootstock Malling Crab C, the cherry stock Malling F12/1 and the pear stocks Malling C2 and C4 (both *P. cordata*) were used in a series of experiments. In a warm propagator exposing the proximal end of the cuttings resulted in better bud development and rooting than did burying the cuttings with the tips just below the surface (the normal nursery practice); the difference was greatest with cherry, less with pear and least with apple. Coating the exposed ends with petroleum jelly, whether clear or blackened, generally reduced rooting. In soil in the open the adverse effect of burial was less pronounced, and with apple it was masked by a depressing effect of exposure, which was, however, avoided by coating. No advantage was gained by either soaking or drying apple root cuttings prior to planting, and excessive drying caused death. Apple root cuttings taken from parents propagated from roots and parents propagated from shoots rooted equally well, as did cuttings taken from vertical roots and from horizontal roots. When, however, 10-in. lengths of root were divided to make 2 cuttings the proximal cuttings rooted better than the distal. Growth substance treatment was ineffective. In a comparison between apple cuttings 1¾, 2½, 3½, 5 and 7 in. long the percentage established rose with each increase in length; the 5-in. cutting is considered to be a good compromise between economy of material and satisfactory establishment.

3528. Zagaja, S.
Wegetatywne rozmnażanie podkładek drzew owocowych przy użyciu "metody wykałaczkowej". **(The use of growth substances to stimulate rooting in the vegetative multiplication of fruit tree rootstocks.)** [English and Russian summaries ½ p. each.]
Prace Zakł. Dendrol. Pomol. Kórniku, 1952, pp. 149-62, bibl. 8 [received 1955].

Toothpicks soaked in alcoholic solutions of growth substances were inserted into shoots of stooled *Malus*, *Pyrus* and *Prunus* rootstock clones 2–3 cm. above the base. Beta-naphthoxyacetic acid had no effect but alpha-naphthaleneacetic acid, especially at 2%, improved rooting and generally produced a dense root system. A negative correlation existed between degree of development and thickness of shoots on the one hand and adventitious rooting on the other.

3529. Carlson, R. F., and Tukey, H. B.
Cultural practices in propagating dwarfing rootstocks in Michigan.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 492-7, illus.

Field studies have been conducted in Michigan during the last 10 years to determine the best methods of producing quality East Malling apple rootstocks. The practices followed are described in detail. An easily worked, fertile soil, high in organic matter, proved most satisfactory for good growth and production of well-rooted shoots. Supplemental water from overhead irrigation was found beneficial especially in autumn. A regular and systematic pest and disease spray programme in the stoolbed was found essential. M. I, IV, VII and IX showed more woolly aphid injury than M. II, XII, XIII and XVI. Crown gall infestation was kept at a low level by roguing and sanitation.

3530. Tydeman, H. M.
Descriptions of the Malling apple rootstocks.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 64-6+tables and 23 pp. plates.

Detailed descriptions, supplemented by photographs, are tabulated of the summer and winter characters of all the rootstocks in the series M. I to M. XXIV and of Malling Crab C.

3531. Woodhead, C. E., and McKenzie, D. W.
Apple rootstock trials. II. Dougherty on East Malling, Merton, and local rootstocks.
N.Z. J. Sci. Tech., Sect. A, 1955, **36**: 560-70, bibl. 4, illus.

The growth and cropping of Dougherty on 12 rootstocks is described for 10 years following planting. Rootstocks included: Malling XII, XIII, XV and XVI; Merton 778, 779, 789 and 793; local selection H/1/26, N/1/19; Large's No. 1 and Northern Spy No. 1. The most vigorous stocks were Large's No. 1, M. XII and Merton 779, all of which produced large trees. Total production of fruits for the 10-year period was highest on Merton stocks 779, 789, 793 and Northern Spy No. 1, yields on these four being similar. Trees on M. XIII and Merton 789 proved susceptible to apple collar rot (*Phytophthora cactorum* (Leb. & Cohn.) Schroet.) and these rootstocks are considered unsuitable for New Zealand orchards. Merton 779 rootstock shows considerable promise for the production of vigorous, yet heavy-cropping trees. [Authors' summary.]

3532. Tukey, R. B., Klackle, R. L., and McClintock, J. A.
Twelve years performance of East Malling rootstocks at Lafayette, Indiana.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 146-50.

East Malling rootstocks I, XIII, XVI and XII were grown in combination with Delicious, Gallia Beauty, Golden Delicious and Turley at Lafayette, Indiana. Tree failure prior to 1950 was principally due to improper anchorage occurring most frequently with EM. I. Trees were injured in the unseasonable freezes which occurred November 1950 and January 1951, and again in December 1951. Injury was greatest on EM. I and EM. XII. EM. I produced trees which, although larger, were lower and more spreading than EM. XIII. Similarly, trees on EM. XII were larger than EM. I, but about the same height as on EM. XVI. Fruit production was highest on EM. I, followed by EM. XVI, EM. XII and EM. XIII in that order. The average tree production on East Malling stocks was less than that customarily experienced with standard trees of the same variety. However, because of the larger number of trees per acre, the average production per acre of all varieties on all East Malling stocks was two to three times as great as is generally experienced in commercial orchards on standard rootstocks in this area. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

3533. Vyvyan, M. C.
Interrelation of scion and rootstock in fruit-trees. I. Weights and relative weights of young trees formed by the reciprocal unions, as scion and rootstock, of three apple rootstock varieties: M. IX, M. IV, and M. XII.
Ann. Bot. Lond., 1955, **19**: 401-23, bibl. 17, illus.

Three apple rootstock varieties, M. IX, M. IV, and M. XII, were combined as scion and rootstock in all nine ways and samples were harvested at intervals over 3 years. Their relative sizes on each occasion and their relative rates of growth between occasions were determined by calculating the ratios between the geometric mean weights. The ratio of the products of these for trees with reciprocal Unlike unions, e.g. IX/XII × XII/IX, to that for trees with Like unions of the component varieties, e.g. IX/IX × XII/XII, was slightly but not significantly less than unity. Composite trees, e.g. IX/XII, resembled in size those of the rootstock type, e.g. XII, more than the scion variety, IX, though this had some influence. [Author's abstract.]—E. Malling Res. Stat.

3534. Kasjjanenko, A. I.
The culture of dwarf fruit trees in the south of the Ukraine. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 54-6.

Apple and pear varieties suitable for dwarf culture are listed in order of ripening. The best rootstocks were found to be: Lipetsk Doucin (type III), Ukrainian Doucin (type V), Armjansk Paradise (type VIII) and Anžersk quince (type A).

3535. Andrjuščenko, D. P.
Dwarf fruit trees in Moldavia. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 56-9, illus.

Of rootstocks used the following are considered the most suitable: Yellow Paradise type IX for dwarf, and Mleevsk Doucin type IV and common Doucin type II for semi-dwarf apple trees; and 2 local forms of quince for pears. Scion varieties are listed according to vigour.

3536. Margolin, A. F.
Characteristics of growth and development in dwarf apple trees on different types of rootstocks. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 51-4, illus.

Undesirable premature bud growth on newly budded dwarf apple trees is induced by high temperatures following budding, but is chiefly due to the biological characteristics of both rootstock and scion varieties. Varieties prone to autumn and spring bud growth respectively are listed. Of rootstocks tested, Doucin type III, Paradise types VIII and IX and seedlings induced early bud growth while Doucin type II appeared to retard it. The average yields of marketable nursery trees of 18 varieties on the different rootstocks were: on type II—75·4%, on type III—47·2%, on type VIII—54·8%, on type IX—63·6%, and on wild apple—87·9%. Data are recorded on the flowering of some rootstock-scion combinations in the nursery.

3537. Evans, W. D., and Hilton, R. J.
Methods of evaluating stock/scion compatibility in apple trees.
Abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

Eight crabapple varieties were used as a source of seed for apple rootstocks, which were budded to two apple varieties. The resulting one-year-old unions were the subject of an intensive study to compare methods of evaluating the compatibility of stock/scion combinations. The following methods of evaluating unions were compared: vigour of scion variety; strength-at-union; water conductivity through the union; macroscopic evaluation of the union; macroscopic evaluation of sections from the union; type of break at the union; premature defoliation; and "take" of buds. Vigour as measured by scion diameter, strength-at-union and water conductivity through the union were the only methods of evaluation considered reliable. Adjustment of scion diameter for the variability in rootstock size improved the reliability of this method.—Univ. Alberta, Edmonton.

3538. Sax, K.
Stock and scion relationship in graft incompatibility.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 156-8, bibl. 3.

Grafting experiments with M. IX and 5 commercial apple varieties, used as scions, and ornamental hybrid apple (20139) seedlings, used as rootstocks, with or without an interstock of Ottawa 534. showed that an incompatibility of scion and rootstock may be evident regardless of the compatibility of the interstock. In the cases described the incompatibility could not be attributed to an imperfect graft union or to the inhibition of phloem transport in the interstock. The causal factor of incompatibility in these graft combinations appeared to involve a reaction between the scion and rootstock varieties which could not be controlled by the use of an interstock.—Bussey Instn, Harvard Univ., Mass.

Pollination.

(*See also* 3616g.)

3539. Tzygankov, S. K.
Pollination by bees increases the number and improves the quality of fruit. [Russian.]
Pchelovodstvo, 1953, **4**: 36-8, from abstr. in *Bee World*, 1955, **36**, No. 136/55.

Apple trees (Simirenko variety) 1 km. from the apiary gave only 42% as heavy a crop as trees 100 m. away. "Forced" cross-pollination of Boiken apples (tree, hive and 10 bouquets of flowers suitable for cross-pollination inside one net) gave fruit on the average 37% heavier, 42% larger (linear), and with a higher percentage of sugar than did "free" pollination by honey bees. No fruit was formed on branches netted against honey bees. In other experiments free cross-pollination gave better fruit than forced self-pollination (15% heavier, higher sugar concentration and 6 times as many healthy seeds).

3540. Passecker, F.
Reizfruchtung durch Erdbestäubung beim Apfel? **(Fruit set induced in apple by dusting with soil?)**
Gartenbauwiss., 1955, **1** (n.s.): 447-9, bibl. 5.

Flowers of Grosser Brünnerling apple were cross- and self-pollinated and dusted with sterilized soil. No fruit from self- or dust-pollinated flowers reached maturity in either of the test years.

3541. Crane, M. B.
Incompatibility and varietal confusion in cherries.
Sci. Hort., 1952-54, **11**: 53-4, bibl. 4.

The principal cherry varieties are grouped according to their pollen compatibility. Recent additions are Caroon B, Rodmersham Seedling and Merton varieties.

3542. von Vahl, E.
Der Kirschenansatz im Alten Land 1955. **(Fruit set of cherries in the Alte Land 1955.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 154-7.

The percentage fruit set of 9 cherry varieties is tabulated for the years 1947-55, the average for the whole period being 28%. Another table records the results of pollination experiments with some other cherry varieties.

Growth phenomena.

(*See also* 3616n.)

3543. Meyer, C. F.
The embryogeny of the McIntosh apple.
Diss. Abstr., 1955, **15**: 19, being *Publ.* 10598 of 156 pp.

The development of the apple embryo from fertilization to maturity has been studied. The stages are described and discussed. The embryo was contrasted with those of *Juglans*, *Zea*, *Phlox* and *Dianthus* with the result that differences were seen to outweigh similarities.

3544. Murneek, A. E.
The embryo and endosperm in relation to fruit development, with special reference to the apple, *Malus sylvestris*.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 573-82, bibl. 49.

Recent work is discussed under the following headings: Seed, fruit and food relationships in the apple; Embryo and endosperm development; Periodicity in fruit development; Embryo abortion in relation to apple abscission; Hormones in relation to fruit growth and abscission; Induction of embryo abortion with growth-regulating substances; Some similarities in metabolism from fertilization and application of growth-regulating substances.

3545. Olafson, G.
Trestorleiken hjå fruktsortane. **(Tree size of fruit varieties.)**
Forskn. Landbruk., 1955, **6**: 153-9, bibl. 3.

On the basis of tree growth curves recorded in 3 localities, planting distances are suggested for several apple and plum varieties, including Bramley's Seedling, Gravenstein, Oullins Gage and Victoria.

3546. Zeiger, D. C., and Childers, N. F.
A precision instrument for measuring trunk diameter increase of orchard trees.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 191-8, bibl. 3, illus.

The dendrometer,* a precision instrument for measuring trunk radius increase of forest trees, has been employed with modifications at the N. Jersey Agricultural Experiment Station to measure trunk diameter increase of orchard trees in apple nutrition and irrigation studies. The instrument has apparently not been used before in experimental work with fruit trees. Suggestions are made for constructing the instrument and preparing tree mounts for application to fruit trees. On well-prepared mounts, duplication of results to one-thousandth of an inch is possible.

3547. Hargrave, P. D., and Shaw, D. A.
Growth studies on apple and crabapple varieties under prairie conditions.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

Terminal shoot growth rates of 8 apple and crabapple varieties checked over a 10-year period were found to decrease rapidly after 20 July in most years. The average date of terminal bud formation was 25 August. With the varieties Atlas, Duchess and Morden No. 343, known from past observation to be late in maturing wood, terminal bud formation lagged behind that of varieties such as Calross, Elsa and Dolgo by 8–10 days. The latter are varieties which mature their wood early and which normally suffer little winter injury.—Alberta Dep. Agric., Brooks.

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* See *H.A.*, 10: (921) and 11: 1404.

3548. Čilikina, M. I.
Growth characteristics of apple varieties in the nursery and their winter hardiness. [Russian.]
Agrobiologija, 1954, No. 6, pp. 129-33, illus.

In the Moscow region the spring growth flush of certain apple varieties developed by Mičurin produces so-called early buds which give rise to secondary growth during the same season. The length of this secondary growth varies from short spurs to shoots over 50 cm. long depending on variety. In the nursery varieties with a tendency to secondary growth are most susceptible to frost damage, as the wood fails to mature. Young bearing trees may also make secondary growth but this becomes less common as the trees age. In general, a cool rainy season induces secondary growth and a dry, hot season retards it. The danger of frost damage to varieties producing vigorous secondary shoots can be reduced by cultural measures which promote growth during the first half of the summer and which encourage the cessation of growth during the second half.

3549. Evans, W. D.
Water losses in woody twigs as associated with periderm thickness.
Rep. Proc. 11th annu. Mtg west. Canad. Soc. Hort. 1955, Banff, Alberta, pp. 40-1, bibl. 1.

Twigs of 5 apple varieties, 2 apple-crab hybrids and a crabapple variety were collected during winter, and water losses and periderm thickness were studied. The results suggest that periderm thickness may be preferred to water loss as a measure of hardiness. Contradictory results were given by water-loss analyses. The positive correlation of the 2 factors was difficult to evaluate. [See also *H.A.*, 25: 1319.]

3550. Wilner, J., and Russell, W. A.
Results of electrolytic test for winter hardiness of apple varieties grown on uniform *Malus robusta* 5 clonal rootstock.
Rep. Proc. 11th annu. Mtg west. Canad. Soc. Hort. 1955, Banff, Alberta, pp. 46-7, bibl. 1.

Current season's twigs were cut from trees on *Malus robusta* 5 rootstock, and given 3 treatments (slow freezing to −40° F., quick freezing to −40° F., and boiling), before electrical conductivity ratings were made. There were significant differences between varieties but not between replications. The results indicate that this method shows promise in the search for a quick laboratory method of determining hardiness.—Forest Nursery Stat. and Exp. Farm, Indian Head.

3551. Wilner, J.
Results of laboratory tests for winter hardiness of woody plants by electrolytic methods.
Rep. Proc. 11th annu. Mtg west. Canad. Soc. Hort. 1955, Banff, Alberta, pp. 47-53, bibl. 5.

Electrical conductivity readings of water extracts from apple twigs were not modified by seasonal variations. In general, the conductivity readings of hardy crabapples were lower than those of the apple varieties tested. There was a direct association between the severity of tissue injury following freezing treatments and the extent of diffusion of electrolytes and other polar substances. Spacing at more than 4×4 ft. or mulching had little effect on the conductivity readings of twigs from 11-year-old caragana, green ash, American elm and boxelder. The readings generally declined with the approach of autumn.

3552. Kolesnikov, V. A.
Something new in the study of the root system of fruit trees. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 44-9.

The function, construction and distribution of the root system and periods of growth in the fruit tree are discussed. The shoots of fruit trees usually have one growth flush of 2½–3 months duration, i.e. May–July, but the roots generally grow in 2 cycles of 2½–3 months each. In the south, where there is an interruption in root growth during the summer droughts, growth occurs over a total of 5–6 months, i.e. May–July and October–November. In the Moscow region in wet years or under conditions of irrigation roots may grow for 7–8 months per annum or longer. The duration of root growth is affected by soil temperature and moisture. Optimum growth occurs between 7° and 20° C.; at 0–7° and 20–30° C. growth is reduced, while below 0° and above 30° C. it ceases. The best soil moisture conditions are 75–85% of field capacity. The effects of autumn irrigation and NPK fertilization on root growth are discussed.

3553. Singh, S. P.
Morphological studies in *Morus* spp.
Agra Univ. J. Res. Sci., 1954, 3: 323-41, illus., from abstr. in *Biol. Abstr., Sect. D*, 1955, **29**, No. 12079.

Female inflorescences of a cultivated variety of *M. alba*, and flowers of *M. indica* and a wild variety of *M. alba* were studied. Morphology of the flower, the vascular supply of the female flower, microsporogenesis of the male gametophyte, megasporogenesis of the female gametophyte, the embryo and endosperm, the seed-coat and the pericarp are described in detail. *Morus* has both monoecious and dioecious species. The cultivated variety of *M. alba*, as observed at Agra, bears female flowers only. Very few embryo sacs reach maturity, and these ultimately degenerate owing to lack of pollination. Thus no seeds are formed and the fruits develop parthenocarpically.

Pruning and training.

(*See also* 3616o, s, 4451.)

3554. Tufts, W. P., and Harris, R. W.
Pruning deciduous fruit trees.
Circ. Calif. agric. Exp. Stat. **444**, 1955, pp. 47, illus.

The authors discuss pruning responses, training systems, training young non-bearing trees, and pruning bearing trees. Fruits included are almonds, apples, apricots, sweet cherries, figs, peaches and nectarines, pears, persimmons, plums, prunes, quinces, walnuts and pecans.

3555. Štampar, K., and Gliha, R.
Utjecaj reza na vegetaciju i prirod bresaka. **(The effect of pruning on growth and production of peach trees.)** [Yugoslav, with French summary 1 p.]
Poljopr. Znanst. Smot., 1953, **15** (1): 89-116, bibl. 10.

Standard peach trees of 4 varieties including Elberta were subjected to severe, light or no pruning for 5 years. Pruning (1) had no effect on girth expansion or fruit shape; (2) delayed flowering and leaf fall; (3) decreased total yield; and (4) increased average weight of individual fruits, extension growth and leaf size. The effect of pruning was most marked in dry years. It is concluded that peaches growing in unfavourable conditions require severe pruning to produce good fruit.

3556. A-., P.
La fertilité de la pomme Starking. **(Fruiting of Starking apple.)**
Rev. romande Agric. Vitic., 1955, **11**: 48.

Yields from 2 tree-forms of Starking apples on M. IX have been observed and compared since 1948. A row of spindle trees has yielded a total of 701·4 kg. of fruit during the 6 years, while 2 similar rows of vertical cordons have yielded 583·3 kg. and 559·2 kg. respectively.

3557. Schmitz-Hübsch, H., and Fürst, L.
Intensiv-Obstbau in Heckenform. **(Hedges for intensive fruit growing.)**
Eugen Ulmer, Stuttgart, at present Ludwigsburg, 1955, 8×6 in., pp. 96, bibl. 13, illus., DM. 6.20.

In the view of many experts fruit growing methods in Germany require drastic changes if home-grown fruit is to compete successfully with imports from countries producing more cheaply. The authors, one of them an eminent figure in the industry, believe that the hedge form of training developed abroad (by Seabrook in England, Bouché-Thomas in France, etc.) is the answer to this challenge, combining, as it does, high yields of good quality fruit per unit area with full mechanization and relatively low maintenance costs.

After a discussion of four foreign systems, a full description is given of two closely related methods of training spindle bushes as hedges which have shown promise under German conditions. Although there is no finality about these recommendations, they certainly deserve trial.

Numerous small but clear photographs illustrate the full instructions on all cultural operations and enhance the value of the many descriptions of implements for soil cultivation and spraying. The appendix gives useful information on such items as planting distances, number of trees per ¼-hectare, yields, manuring and cost of supports for the hedges.

Spraying for cultural purposes.

(*See also* 3616b.)

3558. Woodhead, C. E.
Chemical thinning of apples.
Orchard, N.Z., 1955, **28**(3): 7-9.

Growers' trials on chemical thinning of apples throughout New Zealand have been observed and recorded. These results are tabulated under district, variety, year, tree vigour, concentration, time of application and effects.

3559. Davison, R. M.
The use of chemical thinning sprays on apple trees in New Zealand. Part II. Further experiments with dinitro compounds and synthetic growth substances.
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 1-7, bibl. 5.

Thinning sprays of DNOC and NAA on Sturmer in Hawke's Bay were more effective in 1952-53 than in previous seasons and some overthinning occurred. Both DNOC applied at full bloom and NAA at 50% petal-fall showed promise on Dougherty. All NAA sprays and some dinitro sprays increased russeting on both varieties. NAA on Sturmer caused the foliage to be more susceptible to therapeutant spray injury. On both varieties in Hawke's Bay chemical thinning induced heavier blossoming in the spring following application. Sprays of ammonium dinitro-ortho-secondary-butyl phenate (DNBP) and sodium 2-methyl-4-chlorophenoxyacetate (MCPA) on Sturmer in Nelson, however, caused reduced blossoming the following year.—D.S.I.R., Auckland. [For Part I, see *H.A.*, 25: 2460.]

3560. Anon.
Chemical thinning of apples on trial.
Agric. Gaz. N.S.W., 1955, **66**: 150.

Trials throughout N.S.W. have shown that a single spray of 10 p.p.m. NAA, applied at petal fall, effectively thinned the varieties Delicious, Jonathan and Granny Smith. On Democrat the strength could safely be raised to 20 p.p.m.

3561. Kelley, V. W.
Chemical thinning of peaches and apples in 1954.
Trans. Ill. St. hort. Soc. for 1954, **88**: 211-19.

From tests on Elberta and Halehaven peaches it is concluded that the best time to apply thinning sprays is 2 weeks after the shuck-off stage. NAA formulations seemed to be the safest spray materials. CIPC and the NAA Special dust are considered worthy of further trial. Naphthyl acetamide was ineffective. Wet dusts had more thinning power than dry dusts. All materials tested had less thinning power in 1954 than in previous years, probably owing to the cool weather at and after the time of application. From tests on Transparent apples it is concluded that petal-fall treatment is better than treatment at bloom or 1 week after petal-fall. NAA Special dry dust appeared to be a promising thinning material. Morpholine thiuram disulphide (MTD) and CIPC were ineffective.

3562. Bömeke, H.
Die Ausdünnung des überreichen Fruchtansatzes mit chemischen Spritzmitteln zur Verbesserung der Obstqualität und zur Brechung der periodischen Tragbarkeit. **(Fruit thinning by chemicals for the improvement of fruit quality and the control of biennial bearing.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 127-32, bibl. 1.

Data are tabulated on the response of damson, 3 apple varieties and Bartlett pear to blossom and fruit thinning by dinitro (Elgetol) and hormone (Shellestone) sprays. Results with apples were satisfactory, but treatment of damson and pear needs further investigation. [See also *H.A.*, 24: 2292.]

3563. Mattus, G. E., and Moore, R. C.
Preharvest growth regulator sprays on apples. I. Drop and maturity 1952 and 1953.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 199-208, bibl. 12.

On Starking, Stayman and Winesap preharvest sprays of 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) resulted in a significant and economical decrease in fruit drop. Preliminary tests with 2,4,5-trichlorophenoxyacetamide (2,4,5-TAA) indicated that drop control was as good with this compound as with other growth regulators. The use of the triethanolamine salt of 2,4,5-trichlorophenoxyacetic acid (2,4,5-TA) reduced drop as effectively as 2,4,5-TP except in the case of Winesap. On Golden Delicious fruit drop was not a problem, so the use of sprays was not considered economic. The minimum concentrations used (generally 10 p.p.m.) usually gave as good drop control as concentrations 5–10 p.p.m. higher. In some tests the use of growth regulator sprays significantly reduced the amount of fruit knocked off by pickers at harvest. In 1952 2,4,5-TP at 20 p.p.m. caused fruit softening on all varieties except Winesap, but in 1953 no softening occurred except with 30 p.p.m. 2,4,5-TP on Starking. The use of maleic hydrazide lessened the softening effect of 2,4,5-TP on Starking but not on other varieties. 2,4,5-TA appeared to cause less fruit softening than 2,4,5-TP. The use of 2,4,5-TP at the higher concentrations caused some cracking in Golden Delicious.—Va agric. Exp. Stat., Blacksburg.

3564. Murneek, A. E.
2,4,5-trichlorophenoxypropionic acid as a preharvest spray for apples.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 209-14, bibl. 4.

Extensive experiments over a period of 2 years and experience by growers have shown that 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) is an effective preharvest spray for apples. At 20 p.p.m. it prevents excessive drop over a period of 3–6 weeks and can be used on all varieties with more or less equal efficiency. Thus only 1 application is required. For general purposes and with suitable timing a concentration of 5 or 10 p.p.m. would seem to be just as effective as 20 p.p.m. with many varieties. The effect of 2,4,5-TP on increasing colour and hastening maturity seems to be connected with relatively high temperature and possibly with light, and is greater on summer and autumn varieties than on winter apples.—Univ. Mo., Columbia.

3565. Batjer, L. P., and others.
Results of four years' tests of the effect of 2,4,5-trichlorophenoxypropionic acid on maturity and fruit drop of apples in the Northwest.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 215-21, bibl. 9.

In a 4 years' experiment in central Washington, 2,4,5-TP was highly effective in preventing fruit drop in Delicious and Winesap apples, and was generally more effective than NAA, allowing greater latitude in timing. On Winesap 2,4,5-TP was not more effective than 2,4-D. A concentration of 10 p.p.m. was sufficient for Winesap and Delicious, but at least 20 p.p.m. was required for McIntosh. Treatment applied as early as 44 days before harvest with Delicious and 56 days with Winesap effectively retarded drop. Aeroplane applications were as successful as conventional spray applications with Delicious but not with Winesap. None of the treatments tested had any effect on colour or maturity of Winesap, Delicious or Early McIntosh. With McIntosh, however, firmness and red colour were directly related to concentration and timing, maturity being advanced most at high concentrations and with early applications. Dessert quality of Winesap and Delicious was not affected by any of the treatments. The amount of storage scald varied greatly with different treatments and there was no evidence that spraying with 2,4,5-TP consistently reduced the disorder.—U.S. Dep. Agric. and Wash. St. Coll.

3566. Haller, M. H.
Effect of 2,4,5-trichlorophenoxypropionic acid on maturity and storage quality of apples.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 222-4, bibl. 16.

Preharvest sprays of 2,4,5-TP, at concentrations that control dropping, did not affect maturity or storage quality of the late-fall and winter varieties of apples including Delicious, Golden Delicious, Stayman Winesap, Rome Beauty, York Imperial and Winesap. [Author's conclusions.]—U.S. Dep. Agric., Beltsville, Md.

3567. Liebster, G., and Kettner, H.
Entblätterung von Obstgehölzen und Obstveredlungsunterlagen mit Endothal Harvest-Aid, Code 151. **(Defoliation of fruit trees and rootstocks [in the nursery] with Endothal Harvest-Aid, Code 151.)**
Dtsch. Baumsch., 1955, **7**: 183-8, bibl. 5, illus.

Good results were obtained in the nursery with applications of the defoliant Endothal Harvest-Aid, Code 151 (endoxohexahydrophthalate) on worked fruit trees and rootstocks. The optimum concentration for apple and pear varieties was found to be 0·5%, and for myrobalan seedlings 1%. With apple varieties the desired effect was achieved after 14 days, and with pear varieties and myrobalan seedlings after 10 days. Spraying should be carried out soon after the cessation of growth at a time when the temperature does not fall much below the optimum range of 16–25° C.—Tech. Hochschule München, Weihenstephan.

Nutrition.

(*See also* 3434, 3499i, 3616e.)

3568. Emmert, F. H.
The influence of variety, tree age, and mulch on the nutritional composition of apple leaves.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 9-14, bibl. 15.

Leaves from 3 age groups of McIntosh, Delicious, Cortland and Baldwin apple trees grown in sod with or without additional straw mulch were analysed for N, P, K, Ca and Mg. McIntosh and Cortland had the lowest leaf content of all elements. Delicious was high in N, P and Mg, intermediate in K and low in Ca. Baldwin was relatively high in all elements except N, but the fact that it was in an "off" year and bore no crop may have influenced the results. No significant differences in N, P or K were noted between samples from the different age groups (9–16, 16–25 and 25+ years). Trees of 16–25 years old, however, were higher in Ca and Mg than trees of 9–16 years old. Mulching had no effect on the nutrient content.—Univ. Conn., Storrs.

3569. Mason, A. C.
A note on differences in mineral content of apple leaves associated with fruiting and non-fruiting of biennial bearing trees.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 122-5, bibl. 9.

Leaves were sampled at intervals during two successive growing seasons from 6 apple trees of the strongly biennial variety Miller's Seedling, 3 trees being in their "on" and 3 in their "off" year of fruiting. There were highly significant differences in the composition of leaf samples taken at the same time from fruiting and non-fruiting trees with respect to N, P, Mg, Ca and Mn, all of which occurred in greater concentration in the leaves of trees in their "on" year. There was no significant difference in Fe and K content. [Author's summary.]

3570. Emmert, F. H.
The soluble and total phosphorus, potassium, calcium, and magnesium of apple leaves as affected by time and place of sampling.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 1-8, bibl. 20.

Tip shoot, base shoot, and spur leaves were collected from healthy 15-year-old McIntosh trees at approximately 3-week intervals throughout each of two growing seasons. The samples were analysed for soluble and total P, K, Ca, and Mg. Soluble and total P declined in concentration throughout each season. Little agreement existed from one year to the next in the tip, base and spur leaf differences for either the soluble or the total concentrations. Soluble and total K declined in concentration with time. For both the soluble and total fractions, tip leaves were higher than base and spur leaves at the beginning of the season, but dropped below these two samples with time. Base leaves were generally higher than spur leaves throughout the season. Total Ca showed a steady rise in concentration with time. Soluble Ca increased early in the season only, and then declined in concentration. A spur>base>tip leaf relationship existed for both soluble and total results through the season. Total Mg of the base leaves and soluble Mg of the base and spur leaves declined in concentration with time. A spur>tip >base leaf relationship existed for both soluble and total results. [Author's summary.] [See also *H.A.*, 24: 3514.]—Univ. Conn., Storrs.

3571. Eaves, C. A.
Nutritional survey of apple orchards in relation to storage quality.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

This investigation included analyses of soil (top 6 in. under the tree) and leaves from McIntosh and Northern Spy orchards for N, P, K, Mg and Ca. Except for a positive correlation with K, no relationship existed between the soil and the leaves of McIntosh trees over a period of 4 years. There was a positive relationship between the organic matter in orchard soils and the leaf N in both McIntosh and Spy trees. Rot development in McIntosh apples was significantly associated with a low level of Ca in the leaves.—Canada Dep. Agric., Kentville.

3572. Lecrenier, A., Trzcinski, T., and Dermine, E.
Recherche de l'influence de doses croissantes du même équilibre nutritif sur la composition minérale de divers organes du pommier, au cours d'un essai en plein champ. **(Research on the influence of increased applications of fertilizers in the same nutrient ratio on the mineral composition of various parts of the apple tree, during a field trial.)**
Bull. Inst. agron. Gembloux, 1955, **23**: 176-94, bibl. 5.

Increased applications of a complete fertilizer to standard apple trees were not significantly reflected in the chemical composition of the organs analysed. Buds, leaves, branches and fruits were analysed during the 5 years of the trial; N, P, K, Ca, Mg and Fe were the elements studied. There was no direct relation between yield and chemical composition.

3573. Mori, H., and Yamazaki, T.
Absorption of essential nutrient elements by apple trees in water culture. 1. Seasonal absorption of nitrogen, phosphorus and potassium by non-bearing apple trees.
[Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **23**: 205-13, bibl. 8, illus.

In young, non-bearing apple trees grown continuously in water culture for 5 years (1) N and water absorption were directly correlated with atmospheric (water) temperature; (2) K absorption was correlated with shoot growth; (3) P absorption somewhat resembled that of N but was much less; and (4) nitrate absorption was apparently correlated with growth of fibrous roots. Tree growth was more vigorous than under field conditions.—Nat. Tohoku agric. Exp. Stat.

3574. Zimerman, D.
Ammonium and nitrate nitrogen absorption by young apple trees in soil or artificial nutrient media of varying acidity.
Diss. Abstr., 1955, **15**: 10-11, being *Publ.* 10615 of 193 pp.

The relative rates of absorption of ammonium N and nitrate N were studied with seedlings and young apple trees in greenhouse experiments with soil, sand and solution cultures. Seedling growth in soil of pH 3·5 or in the same soil treated to increase the pH to 5·7 was not limited by the available supply of ammonium or nitrate N. In all treatments receiving lime the application of ammonium sulphate resulted in a larger increase in the N content of the seedlings than the application of an equivalent amount of N as calcium nitrate. The application of lime to the pH 3·5 soil was associated with a high mortality of the seedlings. In a sand culture study at pH 4 and 6 ammonium N was more rapidly absorbed by young apple seedlings than was nitrate N, whether it was applied by subirrigation or to the surface. In a water-culture study ammonium N was more rapidly absorbed at pH 4, 5 and 6 than nitrate N in young apple trees. Relatively higher rates of absorption of ammonium N compared with nitrate N were observed for the more vigorously growing trees.

3575. OLAND, K.
To markforsøk med ulike kvelstoffgjødslinger til Gravenstein. **(Two field trials on the nitrogen manuring of Gravenstein.)** [English summary ¾ p.]
Forskn. Landbruk., 1955, **6**: 161-72, bibl. 11.

In trials in two localities in Norway nitrogen was applied to mature Gravenstein apples growing under permanent grass at rates of from 4·2 to 11·2 kg. N per 1,000 square metres, partly as urea foliage sprays. There was no yield response to any of the treatments and changes in the nitrogen status of the leaves were slow; the effect on fruit colour, however, was marked. In the 4th year trees receiving N at the highest rate bore practically only green apples, while the lowest rate of application resulted in more than 60% red-coloured fruit with a yellowish ground colour.

3576. STOLLE, G.
Blattdüngung im Obstbau. **(Foliar nutrition of fruit trees.)**
Dtsch. Gartenb., 1955, **2**: 211-13, bibl. 7, illus.

The response of young apple seedlings to foliar applications of nitrogen as NH_4OH, NH_4NO_3, KNO_3 and urea is described and illustrated by diagrams and photographs. The trials were carried out on a small scale at the Institut für Obstbau, Marquardt, nr. Potsdam. While exact results are not given, possibilities and dangers are discussed.

3577. EGGERT, R., AND KARDOS, L. T.
Further results on the absorption of phosphorus by apple trees.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 47-51, bibl. 2.

In greenhouse sand culture experiments phosphorus sprays were applied to the leaves and branches of young *Malus robusta* No. 5 trees [see also *H.A.*, 23: 2614]. Three or 5 sprays containing diammonium phosphate appeared to improve growth in the minus P cultures but the differences were not significant. Absorption of foliarly applied P, however, was significantly decreased by supplying P in the substrate, and increased by increasing the number of sprays. From the responses obtained it is concluded that foliarly applied P was unable adequately to supply all the P needs of the trees. It is possible, however, that trees receiving suboptimal amounts of P from the root medium may be benefited by foliar applications of this nutrient.—Univ. N. H., Durham.

3578. GRUPPE, W.
Vergleichende Blatt- und Bodenuntersuchungen in Apfelplantagen und -baumschulen unter besonderer Berücksichtigung von Kalium und Magnesium. **(Comparative leaf and soil analyses in apple orchards and nurseries, with special reference to potassium and magnesium.)**
Gartenbauwiss., 1955, **1** (n.s.): 419-39, bibl. 28.

From manurial trials with young and bearing fruit trees the following conclusions are drawn: A cumulative effect of K manuring was observed, so that by the third year of the trials there were significant differences in K content of plant organs as a result of increased K applications. The Mg content of leaves and petioles was reduced by increased K manuring. There appeared to be a negative correlation between the K/Mg ratio of the soil and the Mg content of the plants. This relationship could be modified by N manuring. In mature leaves of 2 of the varieties tested there was a close relationship between K and Mg contents. This was shown by the negative correlation between K and Mg expressed as percentage of leaf dry weight, and by the constancy of the sum (K+Mg), and to some extent (K+Mg+Ca), expressed as milliequivelants per 100 g. dry weight.—Tech. Hochschule, Hanover. [For Part I see *H.A.*, 25: 2464.]

3579. MACNEILL, M. M.
Some factors affecting the culture of apple trees in pots under glass.
A.R. E. Malling Res. Stat. 1945, 1955, **A38**: 92-5.

Applications of dried blood, either alone or in conjunction with magnesium sprays, resulted in a great improvement in leaf colour and reduced interveinal chlorosis on 6 varieties of apple grown in pots under glass in John Innes potting compost. There was also approximately twice as much wood growth on trees that had received dried blood as in the controls or those given magnesium alone. Spraying with magnesium sulphate had little, if any, effect. [From author's summary.]

3580. BEATTIE, J. M.
Studies on the boron requirements of young apple trees grown in sand culture.
Res. Bull. Ohio agric. Exp. Stat. **754**, 1955, pp. 46, bibl. 24, illus.

Young Rome Beauty apple trees were grown in sand culture during 2 growing seasons under treatments with 3 levels of Ca and B and 2 levels of K and Mg. The influence of these variables on B accumulation and requirement was studied. The leaf contents of Ca, K and B were found by analysis to be relatively high in 1949 and low in 1950. The leaf Mg content was low in 1949 and high in 1950. The level of B supply influenced leaf accumulation to the greatest extent, both independently and in combination with Ca, Mg and K. Maximum B accumulation occurred at the 12 p.p.m. Mg supply level in 1949 and at 60 p.p.m. Mg in 1950. Supplies of K at 30 and 166 p.p.m. did not affect B accumulation significantly. The influence of Ca supply levels of 20, 60 and 180 p.p.m. was direct and positive in both years, but was significant only in 1950. Significant increases in total terminal growth were associated with increasing supply levels of Ca, Mg and K, but not of B. The interaction of Ca, Mg and K on B accumulation was highly significant in both years. When trees of low or high Mg contents were supplied with low or high Mg respectively, maximum B accumulation occurred when the K/Ca ratio of the leaves was between 0·9 and 2·5 milliequivelants. The practical implications of the results are briefly discussed.

3581. Maximos, S. E., and Scott, L. E.
Studies on sodium and potassium nutrition of the peach.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 71–4, bibl. 4.

The complete substitution of Na for K in sand-culture nutrition experiments did not prevent, reduce the severity of, or delay the appearance of K deficiency symptoms in peach trees. Partial substitution of Na for K in the nutrient substrate resulted in failure to maintain growth equal to that of the high K treatments. K content as well as K uptake by the tree tended to follow the level of K in the nutrient solution. The amount of Na in the nutrient solution had little effect on the Na content of leaves and shoots. The trees accumulated very small amounts of Na in comparison to the accumulation of K. It is concluded that Na did not substitute effectively for K in the growth and metabolism of the peach.

Soil management.

(*See also* 3415, 3552, 3616f, x.)

3582. Nott, A. L.
Soil management trial, Upper Beaconsfield.
J. Dep. Agric. Vict., 1955, **53**: 255-7, illus.

A trial has been started on 40-year-old Jonathan and Yates apples which are receiving 4 surface treatments. Preliminary results after 2 years indicate that trees under the 4-inch sawdust mulch showed the best growth and leaf colour. Measurements of annual growth on Jonathan, however, showed no significant difference between sawdust and clean cultivation treatments. No effect on fruit yield of Jonathan was noticed, but fruit colour was poorest under sawdust treatment.

3583. Hughan, D., and Cockroft, B.
Soil management and peach yields.
J. Dep. Agric. Vict., 1955, **53**: 162-4, 167, illus.

Different methods of soil management used in trials on a heavy soil included permanent covers of clover, straw mulch, an oil-sprayed surface, alternate bay irrigation, and the standard local practice of summer weeds and winter weeds. The average canning yield during 6 years from straw-mulched plots was 10·8 tons per acre; that of the summer-weed winter-weed plots was 7·8 tons per acre. The average annual cost of soil management on straw-mulched plots was estimated at £90 per acre, compared with £25 per acre in the summer-weed winter-weed plots.

3584. (Gilbert, F.)
Is it best to cultivate or mulch the cherry trees?
Wis. Hort., 1955, **45**: 288.

A 2-year test at the Peninsula Experiment Station, Sturgeon Bay, has shown that the best moisture conservation in cherry orchards is obtained by clean cultivation. Where it is advisable to grow trees in sod, however, for controlling erosion or preventing spread of cherry leaf yellows, a heavy mulch should also be used. In a comparison of clean cultivation, sod mulch, mowed sod and unmowed sod, terminal growth, number of spurs and first-year yields were highest in the clean cultivated plots, followed closely by those in the sod mulch plots. Frost injury was lowest on the clean-cultivated plots.

3585. Furneaux, B. S.
The cherry tree and the soil.
Sci. Hort., 1952-54, **11**: 60-6.

Cherries, the most fastidious of fruits as regards soil, like deep, well-drained soils of a medium loam texture. The soils in England on which cherries are grown are described.

Harvesting.

(*See also* 3417, 4472.)

3586. Zweede, A. K.
Plukrijpheidscriteria voor appels en peren. **(Standards for judging picking ripeness of apples and pears.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 414-16.

Under variable climatic conditions such as occur in the Netherlands determination of fruit ripeness cannot be based on a single characteristic. Skin colour, firmness of flesh, starch content and seed colour should all be considered in conjunction with meteorological data.

3587. Fisher, D. V., and Porritt, S. W.
Influence of degree of maturity at harvest and length of delay between orchard and storage upon keeping life of Bartlett pears at 32° F.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 33.

Bartlett pears, harvested at firmnesses of 19, 17 and 16 lb. pressure, were placed in storage at 32° F. after 0, 1, 2 or 3 days' delay at 70° F. After storage periods of 7–13 weeks samples from all lots were ripened at 70° F. Fruit from the first pick (19 lb.) showed no adverse effects from delays of up to 3 days before storage. Fruit from the second pick (17 lb.) developed best quality and showed no adverse effects from storage delays of 1–3 days, depending on the orchard in which it was grown. Fruit from the third pick (16 lb.) tended to be coarse in texture and suffered from delays of more than 1 day between orchard and cold storage. A satisfactory storage life of 11 weeks was obtained with 19 and 17 lb. pears stored within 24 hours of picking, but with 16 lb. pears the maximum storage life was about 6 weeks.—Canada Dep. Agric., Summerland, B.C.

3588. Upshall, W. H.
The pre-harvest drop of peaches.
Abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

Observations are reported on the natural dropping of the complete crop of Elberta (1948-54), Fisher (1949-51) and Golden Jubilee (1952-54) trees. Out of 1,000 peaches of each variety, 636 Elberta, 992 Fisher and

948 Jubilee fruits adhered to the tree to a pressure of 5 lb. or less (Ballauf pressure tester, 5/16 in. point) through the skin of both cheeks. The Elberta drop began 4–10 days before the optimum picking time for shipping. However, this early drop was more than counterbalanced by the normal "swell" of the remaining peaches. Hence, on economic as well as quality grounds, picking before the optimum time was not justified. A pressure range of 10–18 lb. is suggested as a compromise between quality and safety from loss through dropping. The drop period averaged in length 25 days for Elberta, 20 days for Fisher, and 17 days for Jubilee.

3589. Bedford, C. L., and Robertson, W. F.
Harvesting and ripening freestone peaches for processing.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 489-91.

Best flavour and quality in canned and frozen peaches is attained when the fruit is harvested at a maturity requiring 3–7 days of ripening at 70–75° F. The fruit should be picked at a firmness of 12 lb. pressure or less. Ground colour can be used as a guide to picking maturity provided it is checked against firmness in each season and each orchard.

3590. Shultis, A.
Prune harvest methods, costs. Comparative study made on efficiency of various types of labor-saving equipment used in 1954 prune harvest season.
Calif. Agric., 1955, **9** (7): 6-7.

The picking and hauling of prunes is estimated to take 20% of the total production cost. A report is made on various methods of harvesting, and comparative costs are tabulated. The total cost for hand harvesting was $13·02 per ton. Machine picking with a Goodwin picker cost $6·84 per ton. Semi-mechanized harvest methods, including cable and pneumatic shaking and catching frames, were intermediate in cost.

3591. McKillop, A. A., Perry, R. L., and Shultis, A.
Lightweight catching frames.
Calif. Agric., 1955, **9** (6): 5-6, illus.

A description, with a diagram, is given of a mobile, canvas catching frame, which has been used successfully to collect prunes, apricots and walnuts shaken from the trees. In a trial on prunes its use resulted in lower harvesting costs and in cleaner and sounder fruit than the conventional method of shaking and collecting off the ground.—Univ. Calif., Davis, Los Angeles and Berkeley.

3592. Anon.
Plukapparaat voor kersen. (**Picking apparatus for cherries.**)
Fruitteelt, 1955, **45**: 605, illus.

A fruit-picking beaker of German origin is described. It is attached by straps to the wrist and fingers of the picker; the fingers are left free for picking the fruit, which drops into the beaker. It is particularly useful for morello cherries, and can also be used for red currants, blackberries, raspberries, strawberries, other cherries and small plums.

3593. van den Muijzenberg, E. W. B.
De verrijdbare werkstelling in de boomgaard. (**Mobile ladders in the orchard.**)
Fruitteelt, 1955, **45**: 572-3, illus.

Some information is given on a 3-wheeled scaffolding apparatus which is manoeuvrable by the operator and can be used for pruning, thinning and picking fruit trees. The pioneering work has been done in America, but tests at the I.T.T. at Wageningen have shown that a saving in time of up to 49% is possible with such an apparatus. [See also *H.A.*, 25: 2489.]

Grading and packing.

3594. Stender, J. A., and Logcher, C.
Beproevingsrapport fruitsorteermachine "Jansen". (**Test report on the Jansen fruit grader.**)
Beproevingsrapport I.T.T. Wageningen **14**/1238, 1952, pp. 5, illus.

The grading accuracy of the Jansen T.C. III-8 was tested with apple and pear varieties of different fruit forms and was found to be satisfactory.

3595. Anon.
Automatic box filler reduces cost.
Apple Res. Digest, 1955, No. 102, pp. 1-3, illus.

An automatic box filler has been designed, giving a loose pack and filling 3–4 boxes per minute with only 2% bruising. The empty boxes are rolled to the filling position by gravity, are automatically filled with fruit to the desired weight, and then ejected onto a conveyor belt.

Storage.

(*See also* 3418, 3616z, 3617b-f.)

3596. Rejman, A.
Studia nad przechowywaniem 12 odmian jabłek. (**Studies on the influence of time of picking on the keeping qualities of apples in common storage.**) [English and Russian summaries 1 p. each.]
Roczn. Nauk rol., Ser. A, 1954, **69**: 349-83, bibl. 34.

Storage trials were conducted over 3 seasons with 12 Polish apple varieties picked at 3 stages of maturity. Fruits from the first picking lost most water by transpiration, showed the highest degree of shrivelling and softened more rapidly than those picked at more advanced stages of maturity. The highest rate of transpiration occurred in the varieties Glogierówka, Antonovka and King of the Pippins, and the lowest in Bohnapfel, Linda, Landsberger Reinette and Kosztela. Delayed picking of Kosztela and Antonovka greatly reduced storage scald; delayed storage of Glogierówka and King of the Pippins increased mealy breakdown. Fungal infection occurred mainly at the beginning of storage, decreased greatly during the winter and increased again in the spring.

3597. Melville, B. T.
Loss of weight of stored Jonathan apples.
Fruit World, Melbourne, 1955, **56** (4): 21, 23.

The effect of handling before cool storage on weight loss and quality in fruit was studied. The loss of weight after 10 weeks' storage varied from 1¼ to 2¼ lb. per case; the least loss occurred in fruit stored immediately after packing. Apples subjected to various periods of shed storage followed by 10 weeks' cold storage showed symptoms of over-storage. Fruit stored immediately after packing were in good condition.

3598. Porritt, S. W., Fisher, D. V., and Edge, E. D.
Use of polythene liners for prolonging the storage life of pears.
Abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

The storage behaviour of Bartlett pears in sealed polythene box liners was investigated. Gas analyses at regular intervals showed fairly constant levels of O_2 and CO_2 during the storage periods, but considerable variation from box to box. O_2 concentrations varying from about 2% to 14%, and CO_2 concentrations from 3% to 9 or 10% were recorded, but not correlated with storage life. A low oxygen disorder, not previously reported in the literature dealing with polythene box liners, affected a considerable number of fruits. The incidence and severity of this disorder increased with length of storage and reduction of oxygen. Film-packed pears that were free from injury ripened normally and were of fair to good quality after 4½ months' storage, two months after the standard-packed check fruit had reached the limit of its storage capacity. Fifty boxes of Bartlett pears, loose filled in polythene liners, ripened normally for a commercial canning test after storage till 9 December. There was no core breakdown, but fruit was graded down because of cutting necessitated by pink end and low oxygen injury.—Canada Dep. Agric., Summerland.

3599. Landfald, R.
En sammenligning av temperaturen i to kassetyper ved lagring av eple i ventilert fruktlager. **(A comparison of apple temperatures in two types of box in ventilated storage.)** [English summary ½ p.]
Forskn. Landbruk., 1955, **6**: 141-51, illus.

The mean temperature of apples kept in ventilated store in a stack of slatted boxes was 0·5° C. lower than that of apples kept in a stack of solid boxes. The temperature in the slatted boxes dropped more rapidly during cooling periods, the difference between the two lots being greatest immediately after cooling. It is estimated that the time taken to ripen the apples in the slatted boxes was 5–10% longer than that to ripen apples in the solid boxes. With both types of box the temperature was considerably higher at the top of the stack than at the bottom. A regular change in the direction of the air current would therefore seem to be desirable. The experiment, of which full records are presented, was carried out over two seasons.

3600. Maxie, E. C., and Baker, C. E.
Air filtration studies in a commercial type apple storage.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 235-47, bibl. 35, illus.

Air filtration studies with activated charcoal were conducted in an experimental storage under conditions representing those existing in commercial warehouses. Measurements of respiration rates at harvest time of commercially handled fruit for three seasons showed that apples from the two orchards involved were post-climacteric at harvest. Evidence is presented to show that the bulk of the fruit in a storage room must be pre-climacteric if activated carbon air filtration is to give any benefit in extending the storage life of apples. Inclusion of post-climacteric fruits as fillers stimulates the ripening rate of pre-climacteric apples in the same room. Air filtration reduced the incidence of storage scald on pre-climacteric fruit but did not constitute an effective control measure. [Authors' summary.]—Purdue Univ. agric. Exp. Stat., W. Lafayette, Ind.

3601. Gerhardt, F., and Siegelman, H. W.
Storage of pears and apples in the presence of ripened fruit.
J. agric. Food Chem., 1955, **3**: 428-33, bibl. 13.

Pears and apples of commercial maturity were stored at various temperatures in both fresh outside air and in the presence of measured quantities of volatiles from ripened fruits. At 31° F. there was no difference in degree of ripeness between the fruit held in different atmospheres. There were no ill effects on cold storage life, flavour or dessert quality and freedom from physiological disorders during subsequent ripening was apparent. Starking Delicious apples were not affected at 31° F., 45° F. and 65° F. when stored with ripened apples of the same variety. Anjou pears were not affected at 31° and 45° F. in the presence of emanations from ripened fruit. At 65° F. the respiratory climacteric of Anjou pears, stored with ripened fruit of the same variety, was hastened by 2 days.—Agric. Mktg Serv., U.S. Dep. Agric.

3602. Fidler, J. C.
Volatile organic products of metabolism of fruits.
J. Sci. Food Agric., 1955, **6**: 293-5, bibl. 3.

Brief notes are given on ethylene and the odorous fraction consisting of alcohols, esters, aldehydes and ketones, and on how they may be eliminated from stores.

3603. Gerhardt, F.
Rates of emanation of volatiles from pears and apples.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 248-54, bibl. 14.

Bartlett pears produced a maximum of 0·87 mg. of ethylene per kg. of fruit per 24 hours after 84 days at 31° F. This was more than 14 times the rate of that from the Anjou variety. The maximum emanation rate of ethylene from [Starking Delicious, Golden Delicious, Winesap and McIntosh] apples during cold storage usually varied from 0·3 to 0·54 mg. per kg. per 24 hours. The non-ethylene volatiles were evolved at a maximum rate of about 33·22 and 3·4 mg. for Bartlett and Anjou, respectively, and of 6 to 24 kg. per 24 hours for the different varieties of apples. The rates of emanation of both ethylene and other volatiles from pears and apples were highest when the fruit was held at a ripening temperature of 65° F. Maximum rates of ethylene emanation were 3·95 and 0·85 mg. for Bartlett and Anjou pears respectively; for apples they ranged from about 2·51 to 4·57 mg. per kg. per 24 hours depending on variety. The non-ethylene volatiles were evolved at a continuously increasing rate with the progress of senescence, and attained their greatest emanation with the appearance of tissue breakdown and the presence of decay organisms. The rate of non-ethylene volatile emanation from Bartlett and Anjou pears, ripened to the stage of prime dessert quality, was about 500 and 75 mg. respectively per kg. of fruit per 24 hours. The rate for apples at their optimum stage of dessert quality (3 days at 65°F.) varied from about 33 for McIntosh to 141 mg. for Golden Delicious depending upon the variety and its maturity at harvest. [From author's summary.]—U.S. Dep. Agric., Wenatchee, Wash.

3604. Marcellin, P.
Le rôle respectif de la cuticule, des lenticelles, du calice et du pédoncule dans les échanges gazeux de la pomme. (**The respective roles of the cuticle, the lenticels, the calyx and the peduncle in gaseous exchange in the apple.**)
C.R. Acad. Agric. Fr., 1955, **41**: 337-9, bibl. 3.

The results are given of respiration studies in Calville blanc apples treated as follows: (1) control, (2) calyx and peduncle sealed, (3) calyx, peduncle and cuticle sealed, (4) calyx, peduncle, cuticle and small lenticels sealed, (5) calyx, peduncle, cuticle and all lenticels sealed, and (6) cuticle and all lenticels sealed. Quantitative conclusions concerning gaseous exchange through the various channels cannot easily be drawn but it was found that suppression or diminution of transfusion through any one affects flow through those remaining free. In the Calville apple (1) the lenticels play an important role in respiration and transpiration, (2) transpiration through the calyx and peduncle is considerable while oxygen transfusion is low compared with that through the lenticels, and (3) oiling the cuticle appears to increase water diffusion.

3605. Anon.
Conservation des abricots. (**[Cold] storage of apricots.**)
Rev. gén. Froid, 1954, **31**: 1177-85, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (6), *suppl. Fruits trop. subtrop.*, No. 12-10474.

Information is given on experiments in progress at Aïn Sebäa Laboratory since 1951 on the cold storage of apricots for 2–8 weeks at −1·5° to +2·0° C.

Composition of fruit.

(*See also* 3616w, 4465.)

3606. Schuphan, W.
Massnahmen zur Förderung des biologischen Wertes unseres Obstes. (**Measures to improve the biological value of fruit.**)
Reprinted from *Arch. dtsch. LandwGes.*, [1955?], **14**: 59-70, bibl. 16.

The significance of variety and other factors such as time of harvest and type of storage for the vitamin and sugar content of fruit should be better understood by growers and consumers. Data are presented on the vitamin C content of apple (see also *H.A.*, 24: 1213) and strawberry varieties, the sugar: acid ratio in strawberry varieties and the effect of maturity at picking on the composition of apricots.

3607. Marx, T.
Über den Oxydationsschutz der L-Askorbinsäure in frischem Pflanzenmaterial. (**Protection from oxidation of l-ascorbic acid in fresh plant material.**)
Z. Lebensmitt.-Untersuch. u.-Forsch., 1954, **99**: 181-8, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1356.

For the determination of reduced ascorbic acid, the extraction of fresh plant material with metaphosphoric acid is considered unsatisfactory. Extraction with ammonium sulphate or sodium chloride, in the presence of oxalic acid, was much more effective in preventing the oxidation of ascorbic acid. Numerous determinations were carried out on apples, pears, quince, currants and gooseberries, and on potatoes and vegetables. Considerable variability was encountered, especially in the content of ascorbic acid in apples. It is concluded that at least some of this variability may be due to climatic or purely local factors.

3608. Murneek, A. E., Maharg, L., and Wittwer, S. H.
Ascorbic acid (vitamin C) content of tomatoes and apples.
Res. Bull. Mo. agric. Exp. Stat. **568,** 1954, pp. 24, bibl. 52.

Tomatoes. In general, ascorbic acid content was lower in greenhouse fruit than in outdoor fruit of the same variety and size, lower in mature (green) than in ripe (red) fruit, lower in the larger fruits, and lower with increased soil nitrogen; it was not, however, affected by growth substance sprays to improve fruit set and size. *Apples.* Summer apples had, in general, a higher ascorbic acid content than autumn or winter apples (Winesap being a winter apple with a particularly high content), but they lost it more rapidly on ripening in common storage. As fruit matured and then ripened ascorbic acid content first increased then decreased. All apples except Winesap lost ascorbic acid rapidly in common storage and more slowly in cool storage. A negative correlation existed between soil nitrogen or tree vigour and ascorbic acid content. In both tomatoes and apples a positive correlation existed between light and ascorbic acid content, and ascorbic acid was rapidly destroyed when internal tissue was exposed to the air.

3609. Bogdańska, H., and Bogdański, K.
Wpływ przechowywania różnych odmian jabłek na wahania zawartości kwasu l-askorbinowego jako funkcji zmian jędrności miąższu. (**Influence of the storage of different apple varieties on l-ascorbic acid content as a function of changes in the firmness of the parenchyma.**) [English and Russian summaries ¾ p. each.]
Roczn. Nauk. rol., Ser. A, 1954, **69**: 385-408, bibl. 77.

The l-ascorbic acid content of 20 apple varieties was determined after different storage periods. Four weeks' storage at an average temperature of 6·2° C. gave an average loss of 1% ascorbic acid per day, and a further 6 weeks' storage at 3·5° C. resulted in either synthesis or decomposition of the vitamin depending on the rate of softening of the parenchyma of the variety concerned, a slow rate of softening inducing synthesis.

3610. BOGDAŃSKI, K., AND BOGDAŃSKA, H.
Wpływ przechowywania jabłek na zawartość witaminy C. **(The effect of storage on the content of vitamin C in apples.)**
Przem. Rol. Spoż., 1954, **8**: 446-51, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1941.

During the first month of storage the content of ascorbic acid in the apple variety Boiken tended to increase to nearly twice the initial amount, especially at low temperatures. In general, the higher the storage temperature the more rapid was the loss of firmness of the flesh and the greater the decrease in ascorbic acid. For the variety Ben Davis, 2° C. was the optimal temperature for retention of ascorbic acid. Dehydroascorbic acid usually represented 14% of the total ascorbic acid; the variety Boiken contained least dehydroascorbic acid.

3611. SIEGELMAN, H. W.
The sugars of Grimes Golden apple and Bartlett pear skin.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 232-4, bibl. 10.

The sugars of Grimes Golden apple and Bartlett pear skin were identified by paper chromatographic methods and chromogenic colour spray reactions. The following were found: sucrose, glucose, fructose and xylose. [Author's summary.]—U.S. Dep. Agric., Beltsville, Md.

3612. JACQUIN, P., AND TAVERNIER, J.
Contribution à l'étude des principaux constituants des poires à poiré au cours de la croissance et de la maturation. **(Contribution to the study of the principal constituents of perry pears in the course of growth and ripening.)**
Ann. Tech. agric., 1954, **3**: 209-29, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1353.

In 4 varieties of perry pear malic acid increased from the time of fruit-set for about 78 days, to a maximum concentration of 250 to 350 milli-equivalents, and then decreased until harvesting maturity. Small amounts of citric acid were present throughout, except in one variety (Granville) in which citric acid increased markedly as malic acid decreased. Glucose and fructose increased throughout; sucrose appeared only when malic acid began to decrease. The contents of tannoids increased and decreased in parallel with the content of malic acid.

3613. SIEGELMAN, H. W.
Quercetin glycosides of Grimes Golden apple skin.
J. biol. Chem., 1955, **213**: 647-54, bibl. 19.

A procedure for the paper chromatographic separation and identification of a mixture of quercetin and quercetin glycosides is described. Hyperin (quercetin 3-galactoside), isoquercitrin (quercetin 3-glycoside), avicularin (quercetin 3-arabinoside), quercitrin (quercetin 3-rhamnoside), rutin (quercetin 3-rutinoside), and the hitherto unreported quercetin 3-xyloside were identified from the skin of Grimes Golden apples. [Author's summary.]—Biol. Sci. Branch, agric. Mktg Serv., U.S. Dep. Agric., Beltsville, Md.

Processing.

3614. NEUBERT, A. M., CARTER, G. H., AND VAN DOREN, A.
Effect of fruit handling methods on juice quality of apples.
Food Tech., 1955, **9**: 114-18, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1882.

Juices from fancy to extra-fancy grade Jonathan and Winesap apples had a higher sugar content, a lower acid content and a more desirable flavour than those from C grade fruit of the same varieties given the same ripening treatment. Juices from cull quality Winesap apples were comparable with, or had slightly less flavour than, those from C grade fruit given the same ripening treatment. Post-harvest ripening of all fruits was accompanied by decrease in firmness, loss of starch and acid, and increase of sugar. Post-harvest ripening for at least 1 week was found to be necessary to avoid an undesirably sharp, astringent flavour in juices prepared from these varieties. A ripening period of 2 to 4 weeks was found desirable for Jonathan apples picked before optimum maturity. Unlike Delicious apples, these varieties did not develop a pronounced aromatic flavour during post-harvest ripening, and when they were picked at optimum maturity for the fresh fruit market ripening for 4 to 6 weeks resulted in juices of poor flavour. The advantage of post-harvest ripening for Jonathan and Winesap apples was not apparent when juices from these varieties were used in blends with juice from fully-ripened Delicious apples.

3615. CALDWELL, J. S., CULPEPPER, C. W., AND DEMAREE, K. D.
Quality of frozen apples related to variety and ripeness.
J. agric. Food Chem., 1955, **3**: 513-18, bibl. 3.

The suitability of 16 apple varieties for freezing was evaluated, and the effect of ripeness on the quality of the frozen product was studied. Fruit harvested at the firm ripe stage of maturity and frozen without further ripening was inferior in flavour to fruit ripened to a good edible stage before freezing. In general Jonathan, Yellow Newtown, Golden Delicious and York Imperial were considered best for freezing.—Agric. Mktg Serv., U.S.D.A.

Noted.

3616.
a BAGENAL, N. B.
The history of cherry growing in England.
Sci. Hort., 1952-54, **11**: 41-5.
Since their supposed introduction by the Romans. [See also *H.A.*, 25: 2414.]

b BARAK, D.
Thinning apples by chemical means. [Hebrew, with English summary 1¼ pp.]
Publ. Israel Minist. Agric. **59**, 1955, pp. 19, bibl. 9.
For brief account of work, see *H.A.*, 24: 3496.

c BENNETT, A. J.
Trends in acreage and production of apples.
Fruit World, Melbourne, spec. number, January 1955, pp. 31-7, illus.
In Australia.

d Białobok, S.
Morfologia i anatomia zrosniecia zrazu z podkladka niektorych gatunkow i odmian z rodzaju *Malus*. **(Morphology and anatomy of graft unions in certain species and varieties of *Malus*.)** [English and Russian summaries ½ p. each.]
Prace Zakł. Dendrol. Pomol. Kórniku, 1952, pp. 260-84, bibl. 23, illus.

e Black, J. D. F.
Fertilizers for apples in southern Victoria.
J. Dep. Agric. Vict., 1955, **53**: 325.
Trials showed the importance of potash.

f Craig-Brown, H.
Irrigation and fruit size.
J. Dep. Agric. Vict., 1955, **53**: 161-2, illus.
Notes on peach orchard irrigation.

g Crowe, A. D.
Productive apple trees and pollination possibilities.
90th A.R. N. Scotia Fruit Grs' Ass. 1953, pp. 101-7.
Pollination by bees and supplying pollen in the hive exit.

h Dicker, G. H. L., and Kirby, A. H. M.
Some impressions of apple orchard practices in Canada.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 160-4, illus.
A popular account with emphasis on pest and disease control.

i Dickson, G. H.
Plum breeding, 1913 to 1937.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 34.
At Vineland Station, Ontario.

j Drain, B. D.
Blight resistant pears of today and tomorrow.
Trans. Ill. St. hort. Soc. for 1954, **88**: 125-7.

k Evans, O. R.
Canada's apple industry.
Brit. agric. Bull., 1955, **8** (37): 41-5, illus.

l Garner, R. J.
Cherry tree production.
Sci. Hort., 1952-54, **11**: 56-9.
Including rootstocks, methods of working, precautions against virus disease.

m Harrison, T. B.
A review of factors involved in peach tree growing. A discussion on methods of improving peach fruit quality.
90th A.R. N. Scotia Fruit Grs' Ass. 1953, pp. 17-22 and 85-7.—Dom. exp. Stat., Harrow, Ont.

n Hasegawa, M., and Shirato, T.
Flavonoids of various *Prunus* species. IV. The flavonoids in the wood of *Prunus donarium* var. *spontanea*.
J. Amer. chem. Soc., 1955, **77**: 3557-8.
The species is a common wild cherry in Japan.

o Horticultural Education Association Fruit Committee.
A glossary of terms used in pruning fruit trees.
Sci. Hort., 1952-54, **11**: 67-74, bibl. 25, illus.
Pome and stone fruits.

p Hutchinson, A.
Methods of vegetative propagation influencing winter survival of tree fruits.
Rep. Proc. 11th annu. Mtg west. Canad. Soc. Hort. 1955, Banff, Alberta, pp. 44-5.
The use of hardy seedling and clonal rootstocks and intermediate stocks.

q Karnatz, H.
Der gegenwärtige Stand der Unterlagenverwendung in den deutschen Baumschulen. **(A census of rootstocks in German nurseries.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 160-1.
With special reference to apple.

r Kidman, G. J.
Thinning and fruit size.
J. Dep. Agric. Vict., 1955, **53**: 159-61.
Of peaches.

s Kilpatrick, D. T.
Some guiding principles in pruning the young peach and apricot tree.
J. Dep. Agric. S. Aust., 1955, **58**: 393-7, illus.

t Klein, L. G.
Promising new Delicious color sports.
Fruit Var. hort. Dig., 1955, **10**: 8.
Colour, but not maturity, developed earlier in these sports.

u Kovalev, N. V., and Kalmykov, S. S.
An artificial hybrid of dwarf cherry × cherry plum. [Russian.]
Agrobiologija, 1954, No. 6, pp. 133-7, illus.
A central Asiatic dwarf cherry × *Prunus sogdiana*.

v Lijsten, R.
Lombartscalville [apple variety].
Fruitteelt, 1955, **45**: 656-7, illus.

w McCarty, C. D., and Lesley, J. W.
The carotenoids, amygdalin content, and titratable acidity of white- and yellow-fleshed peaches within a nearly isogenic line.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 289-92, bibl. 4.

x Maurer, K. J.
Die Bodenpflege vom Standpunkt des Obstbaues. **(Soil cultivation in the orchard.)**
Tech. Landw., 1955, **7**: 351-3, illus.
Mainly implements for light turning in of cover crops.

y Mowry, J. B.
Peach breeding and grape testing in 1954 at the Illinois Horticultural Experiment Station.
Trans. Ill. St. hort. Soc. for 1954, **88**: 202-7, bibl. 3.

z Rowe, A. L.
The construction and insulation of timber cool rooms for fruit storage.
Fruit World, Melbourne, 1955, **56** (6): 9-15, illus.
Practical instructions.

3617.
a Stark, P., and others.
Expectations and experiences of dwarf rootstocks.
Trans. Ill. St. hort. Soc. for 1954, **88**: 39-53.
For apples, especially Malling stocks and Clark Dwarf.

b Stoll, K.
Einige Beobachtungen bei der Kaltlagerung von Äpfeln. (**Some observations on the cold storage of apples.**)
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 295-300, illus.
Time of harvesting, colour grading prior to storage, storage temperature, after-ripening at 7–8° C.

c Ulrich, R., and others.
Recherches sur la réfrigération des pommes (année 1952-53). (**Research in 1952/53 on the cold storage of apples.**)
Rev. gén. Froid, 1954, **31**: 678-81, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1860.

d Ulrich, R., Paulin, A., and Leblond, C.
Observations sur la réfrigération des pommes Canada (1953-1954). (**Notes on the cold storage of Canada apples (1953-1954).**)
Rev. gén. Froid, 1954, **31**: 1163-9, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1861.

e Ulrich, R., and Paulin, A.
Recherches sur la maturation des poires Passe-Crassane consécutive à la réfrigération à 0° ou +4°. (**Research on the ripening of Passe-Crassane pears after cold storage at 0° or +4° C.)**
Rev. gén. Froid, 1954, **31**: 565-6, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1862.
Ripening with and without ethylene at different temperatures. [See also *H.A.*, 25: 1363.]

f Ulrich, R., and Paulin, A.
Maturation, par action combinée de la chaleur et de l'éthylène, des poires Passe-Crassane préalablement conservées à diverses températures. (**Ripening, by the combined action of heat and ethylene, of Passe-Crassane pears previously stored at different temperatures.**)
Rev. gén. Froid, 1954, **31**: 1255-7, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1863.

g de Viguerie, P.
Les variétés de pêcher à cultiver. (**Recommended peach varieties.**)
Tarn Garonne agric., 1954, No. 11, pp. 190-1, No. 12, pp. 206-7, and 1955, No. 1, p. 5, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (5), suppl. *Fruits Zone temp.*, p. 12.
For south-western France.

h Webber, E. R.
Cider-apple growing in the United Kingdom.
World Crops, 1955, **7**: 226-30, bibl. 6, illus.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 3410, 3411, 3498m, x, 3499i, 3506, 3509, 3673c, i, k-m, q, r, t, u, 3900, 4341, 4478.)

3618. Hall, E. R., and Webster, G. R.
Experiments with small fruits 1943-54.
Mimeo. Saanichton Dom. exp. Stat. **157**, 1955, pp. 16, bibl. 6.

Strawberries: In field and pot experiments chemical fertilizers had little effect on growth or vigour of the plants. In a 3-year trial, sawdust mulch and sawdust incorporation treatments resulted in the highest fruit yields, followed by manure, compost and straw mulches and control in that order; yields from the sawdust mulch plots were 1·37 tons per acre higher than those from the control plots. Over a 2-year period irrigated plants yielded 0·94 tons per acre more than non-irrigated plants; irrigation had little or no effect on storage quality. Breeding is directed mainly at red-core resistance. Suitable varieties for British Columbia are listed. Plants sprayed with 1 lb. captan plus 3 lb. wettable S in 100 gal. gave better yields of fruits with less mildew and more attractive appearance than unsprayed plants. *Boysenberries:* Sawdust mulch resulted in highest yields in a 7-year soil management trial; hay mulch increased the vegetative vigour of the plants at the expense of flowering. [See also abstr. 3629.] *Loganberries:* Sawdust mulch increased the yield over the controls by 3,079 lb. per acre per year. [See also abstr. 3630.] Irrigation increased yield by 3,326 lb. per acre, and also improved the cane growth. A spray programme of captan, malathion and streptomycin reduced dry-berry infection from 19·3% on unsprayed plots to 9·7%. Breeding experiments indicated that fruit quality can best be introduced from *Rubus ursinus* and dry-berry resistance from *R. fruticosus*. Hybrids related to the loganberry have been tested. *Raspberries:* Irrigation improved yields; the average requirement of irrigation water was 6·8 in. per year. Washington and Taylor are the varieties recommended. *Grapes:* Black and green varieties for B.C. conditions are listed. The 2 pruning methods used, arm-renewal and permanent arm, resulted in about equal yields. *Currants:* Sawdust mulching of both black and red currants improved the yields. *Gooseberries:* Sawdust mulch improved the yields of Champion and Poorman varieties which were considered more suitable for B.C. conditions than the English varieties tested.

3619. HASKELL, G.
The genetic detection of natural crossing in blackberry.
Reprinted from *Genetica*, 1954, **27**: 162-72, bibl. 27.

The pollination system in 4*x* blackberry was studied from vicinism (cross-pollination with neighbouring plants) in a row of Merton Thornless plants growing between rows of thorny *Rubus* spp. Average hybridization was 17%, and average first-year germination of hybrid seed was 45%. The results showed that flower position, inflorescence orientation and the position of the plant relative to others were among factors affecting vicinism.—John Innes hort. Instn, Hertford.

3620. DARROW, G. M.
Blackberry-raspberry hybrids.
Heredity, 1955, **46**: 67-71, bibl. 14, illus.

Seedlings raised from crosses between the diploid erect-growing blackberry Early Harvest and diploid raspberries were vigorous and did not sucker. More than half of them were pistillate. They had a high percentage of resistance to leaf spot and anthracnose. The fruit of the 2 fertile seedlings obtained did not separate easily from the stem or receptacle, thus having no commercial value.—U.S.D.A., Beltsville, Md.

3621. DARROW, G. M.
Nature of thornless blackberry sports.
Fruit Var. hort. Dig., 1955, **10**: 14-15, illus.

Most thornless blackberry sports appear to be sterile, but Cory Thornless, Evergreen Thornless, Bauer Thornless Logan and Thornless Young have all been consistently productive. Evergreen Thornless is apomictic, while the others are hexaploid; all are apparently chimeras. Thornless plants may be propagated vegetatively by tip rooting, but root cuttings give rise to thorny plants.

3622. PRESTON, A. P.
A black currant variety trial.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 78-81, bibl. 6.

Results are presented for a 7-year black currant variety trial that included the older varieties Boskoop Giant, Goliath, Seabrook's Black and Baldwin, together with the more recently introduced Mendip Cross, Wellington XXX and Westwick Choice. Observations were made on blossoming and fruit setting, incidence of disease, time of picking and fruit yield. Wellington XXX gave the heaviest total crop and Boskoop Giant the lightest, all bushes being uniformly spaced at 5 ft. × 7 ft. 6 in. The yields are discussed in relation to bush size. For conditions similar to those at East Malling, of the varieties tested Mendip Cross is suggested as a replacement for Boskoop Giant, Wellington XXX as a high yielding mid-season variety and either Westwick Choice or Baldwin as a late variety. [Author's summary.]

3623. JOHNSTON, R. E., STORRIE, D. L., AND HALL, J. W.
Black currants and red currants.
Adv. Leafl. Dep. Agric. Scotland **12** (n.s.), revised 1955, pp. 9, illus., 9d.

[For abstract of the first edition, see *H.A.*, 20: 604.] The section on black currant varieties has now been revised in the light of results of recent trials carried out under the direction of the Scottish Fruit Trials Committee. Varieties here listed as being apparently suitable for Scottish conditions include: early varieties—Laxton's Giant, Laxton's Grape and Mendip Cross; mid-season varieties—Cotswold Cross, Blacksmith, Seabrook's Black, Wellington XXX and Westwick Choice (the last 2 named and Baldwin being more susceptible to frost than other varieties tested); late varieties—Amos Black, Daniel's September, Baldwin.

3624. PRESTON, A. P.
Pruning trials with black currants.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 82-5, bibl. 1.

Two trials are described. In the first, involving 3 varieties, winter pruning of bushes spaced 5 ft. apart in rows 7 ft. 6 in. apart produced significantly higher yields per acre of better quality fruit over 9 years than did cutting alternate bushes spaced 3 ft. apart to ground level every other year; the latter treatment, however, resulted in the production of a larger amount of new wood suitable for cuttings. In the second trial bushes of Wellington XXX pruned after picking yielded an average of 12% more fruit over a period of 4 years than did bushes pruned in the winter, and during a dry summer the former produced more secondary shoot growth. An estimate of "running-off" made in one year showed that winter-pruned bushes set a higher proportion of berries than did bushes pruned after picking, but this did not affect the ultimate yield. There were no significant differences between treatments in earliness of leafing-out. Application of nitrogen after picking instead of in spring had no significant effect on "running-off" or fruit yield..

3625. BOULD, C.
Seasonal changes in the major nutrients of black currant leaves.
J. hort. Sci., 1955, **30**: 188-96, bibl. 5.

The positional and seasonal changes in the N, P, K, Ca and Mg contents of current growths of black currant, variety Mendip Cross, are described and discussed in relation to leaf sampling for comparative and diagnostic purposes. Leaf N decreases with position (being lowest in the oldest leaves) and with advancing season until early June, when positional differences are at a minimum; N levels remain fairly constant for the next 3 weeks. The seasonal trend in leaf P content is similar to that of N until early June, after which time the concentration in the older leaves remains fairly constant while that of the younger leaves continues to fall; positional variation differs from that of N. The K concentration decreases with age of leaf in respect of position and season. Leaf Ca concentration decreases from base to tip and increases almost linearly with season. Leaf Mg concentration decreases from base to tip and increases slightly with season with least variation in the middle third region of the shoot. It is suggested that leaf samples taken from the middle third region of current shoots just prior to fruit maturity are suitable for comparative and diagnostic purposes in respect of N, P, K and Mg.—Long Ashton Res. Stat.

3626. TOWER HILL.
Progress Report Dominion Blueberry Substation, Tower Hill, N.B., 1949-1953, 1955, pp. 23.

The substation was established at Central Tower Hill, Charlotte county, N.B., in 1949 to investigate problems of lowbush blueberry (*Vaccinium angustifolium*) culture. *Horticulture:* The 3 main aspects of the work are: improvement of existing, naturally established stands; planting of new fields; and selection and propagation of better varieties. Brush cutting was most effective in July and August. Results of fertilizer experiments indicate that when soils are fertile enough to grow grass it is better not to apply fertilizer. A description is given of 6 methods of land preparation and 8 methods of planting or sowing, none of which appears wholly satisfactory. Some clones and seedlings are under observation; no controlled crosses have yet been made. Notes are given on attempts to cultivate varieties of highbush blueberry. Long narrow plots appear more suitable for yield comparisons than square ones. *Insects:* A description is given of the biology and control of the following economically important insect pests: blueberry maggot (*Rhagoletis pomonella*), black army cutworm (*Actebia fennica*), chain-spotted geometer (*Cingilia catenaria*), blueberry flea beetle (*Altica sylvia*) and blueberry thrips (*Frankliniella vaccinii*). *Diseases:* For control of witches' broom (*Calyptospora goeppertiana*) and red leaf (*Exobasidium vaccinii*) no chemical treatments have proved effective. Blossom and twig blight (*Botrytis cinerea* and *Monilinia vaccinii-corymbosi*) were greatly reduced by 2 or 3 applications of ferbam. In fungicide tests ferbam was found to be the least toxic to blueberries. *Ecology:* Classification of *Vaccinium* spp. around the substation; spread of blueberries and weeds. [For fertilizer and mulching experiments and weed control, see abstracts 3627 and 3846.]

3627. Taylor, E. M.
Fertilizer and mulching experiments [on blueberry].
Progr. Rep. Dom. Blueberry Substat. Tower Hill, N.B., 1949-1953, 1955, pp. 12-13.

For the purpose of determining the value of commercial fertilizers and sawdust mulch for blueberries, a series of experiments has been conducted since 1948 in 3 locations. Six square plots were each divided into 4 sections which were treated with: fertilizer; fertilizer and mulch; no fertilizer and mulch; and no fertilizer, no mulch. Each plot received a different fertilizer treatment; the mulch was applied in all cases to a depth of 1 in. In the aggregate, mulching without fertilizer application gave the highest yield, and fertilizers without mulching the lowest. Plots fertilized and mulched yielded practically the same as the control plots, suggesting that the value of mulch was offset by the fertilizer. The use of fertilizer resulted in increased growth of both crop and weeds.

3628. (Maine Agricultural Experiment Station.)
An efficient blueberry stemmer.
Me Fm Res., 1955, **3** (1): 12-13, illus.

The machine described removes the fruit stems and other extraneous matter from the harvested blueberry crop.

3629. Webster, G. R., Hall, E. R., and Woods, J. J.
The effect of fertility treatments on the behaviour of boysenberries.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 34.

Boysenberries planted in 1946 were given 4 treatments: sod (later changed to hay incorporated), cultivation, sawdust mulch and hay mulch. For the years 1948 to 1951 the sawdust-mulched plants produced much the highest yields, whereas for 1952 to 1954 the hay-incorporated plots produced the highest yields. Yields decreased with increased plant vigour. Strongly vegetative plants bore very few flowers which accounted for the low yields. The hay mulched plants had the highest N, P and K contents and the lowest Mg content of all treated plants. The cultivated plants had the lowest N, P and K contents. Results indicated that treatments which increased plant vigour by conserving soil moisture and increasing soil fertility adversely affected yields. This abnormal result is a peculiarity of the boysenberry. With loganberries there is always a positive correlation between vigour and yield. [See also *H.A.*, 24: 3416.]—Canada Dep. Agric., Saanichton.

3630. Webster, G. R., Hall, E. R., and Woods, J. J.
The effect of sawdust mulch on loganberry yields.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

Sawdust at a depth of 3 inches, applied in May 1948 to fruiting plants of loganberries, increased the yield by 3,079 lb. per acre per year for a 7-year period. At the prevailing cannery price (in 1954) of 16 cents per lb., gross revenue was increased by $492.00 per acre per year. The initial sawdust cost ($128.00) and labour cost for spreading ($25.00) amounted to $153.00 per acre. No supplementary applications of sawdust were required during the period (1948-54). A positive correlation was shown to exist between cane weight and yield. [See also *H.A.*, 24: 3416.]—Canada Dep. Agric., Saanichton.

3631. Wood, C. A.
Raspberry variety trials and cultural experiments.
Bull. Edinb. Coll. Agric. **47,** 1954, pp. 17-23.

A brief survey is given of variety trials in the Strathmore area and of raspberry breeding, the performance of new E. Malling seedlings and cultural experiments at Mylnefield. In the cultural experiments the following results were obtained. Growth and cropping of individual plants was best at the widest spacing (8½ × 3 ft.) but fruit yields and cane populations per acre were highest at the closest spacing (5½ × 2 ft.). Occurrence of grey mould (*Botrytis*) appears to be determined much more by weather conditions than by spacing. In 1953 a significant yield increase was obtained by increasing tipping height from 4 to 4½ ft., but a further increase to 5 ft. gave only an insignificant yield increase and then only with Norfolk Giant and Malling Promise. In 1954 an increase in tipping height up to 5¼ ft. resulted in a moderate yield increase in all varieties but 5¼ ft. is often too high for satisfactory picking. Results of single *versus* double planting trials (1 or 2 canes at each site) indicate that double planting of many varieties, particularly those that naturally produce few canes, can lead to a sufficient increase of crop to justify the higher initial cost. Picking at 2- to 3-day intervals resulted in a total yield increase of 25·5% for Malling Promise and 10·72% for Lloyd George, compared with picking at 4- to 6-day intervals. Increasing the number of canes per stool from 3 to 4 and from 4 to 5 resulted in appreciable increases in yield, but a further increase of cane number to 6 per stool was of no advantage. [See also *H.A.*, 25: 1380.]

3632. BROWN, I. L.
Commercial raspberry production in the Nelson District.
N.Z. J. Agric., 1955, **90**: 417-24, bibl. 3, illus.

Most of the crop grown is taken by local jam and canning factories, and the variety Red Antwerp (138 acres) is the most important. Lloyd George is also grown (19 acres). The canes are planted on the hill system in groups of 5. New season's canes are thinned to at least 12 per hill, and are tied together just below the point at which they are topped (3½-4 ft.). Yields vary between 1½ and 3 tons per acre.

3633. CADMAN, C. H., AND OTHERS.
Raspberry cultivation.
Adv. Leafl. Dep. Agric. Scotland **14** (n.s.), revised 1955, pp. 8, 6d.

[For abstract of the first edition, see *H.A.*, 20: 611.] The bulletin has now been revised, particularly with regard to information on planting distances, tipping height, varieties, raspberry beetle control, and inspection and certification schemes.

3634. COX, E. H. M.
The cultivation and marketing of raspberries and strawberries in the Pacific North-Western states of America.
Bull. Edin. Coll. Agric. **47**, 1954, pp. 9-16.

With a note on the reasons for the failure of Scottish raspberry exports, mainly bad packing.

3635. SMITH, W. H.
Soft fruit—cutting marketing wastage.
Comm. Gr, 1955, No. 3103, p. 1395.

Recent research at Ditton Laboratory has shown that CO_2 may be used with advantage in soft fruit transport. The best treatment appears to be rapid cooling of the fruit to 40–45° F. in an atmosphere of 20–25% CO_2 in air, preceding transport under the same conditions. Such treatment has proved satisfactory for strawberries and raspberries.

3636. WAY, D. W., AND FREEMAN, G. H.
Preliminary tasting trials with strawberries and raspberries.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 96-8, bibl. 3.

Methods of assessing the palatability of different varieties of soft fruit are given, and the results for 2 trials with strawberries and 5 with raspberries using these methods are described. The methods, which involve individual assessment of randomly presented varieties, are shown to be accurate and sensitive, as far as they go. The results tend to confirm popular opinion of the palatability of certain of these varieties. The strawberries Royal Sovereign (M.48) and Auchincruive Climax (M.46) were, on the basis of these preliminary trials, adjudged to be the most palatable of those tested, and Malling Promise and Malling Seedling "Z" the most acceptable of the raspberries used in more than one trial. Future work is envisaged in which flavours rather than preferences can be assessed. [Authors' summary.]

3637. MINISTRY OF AGRICULTURE, LONDON.
Soft fruit growing. Strawberries.
Bull. Minist. Agric. Lond. **95**, 5th edition, 1955, pp. 44, illus., 2s. 6d.

This bulletin has been thoroughly revised since the 1952 edition [see *H.A.*, 23: 304]. The section on out-of-season production has been entirely rewritten in the light of recent developments on photoperiodic control and cloche management. A brief note is also included on the culture of autumn-fruiting varieties. The section on varieties has received special attention in view of the development of certified stocks of some varieties and the decline of others. Two new appendixes have been added on the Certification Scheme and the Nuclear Stock Scheme.

3638. CAMPBELL, R. W., AND AMSTEIN, W. G.
Growing strawberries in Kansas.
Circ. Kans. agric. Exp. Stat. **317**, 1955, pp. 24, illus.

This circular includes descriptions of 16 varieties and gives advice on sites, soils, propagation, rotations, cultivation, manuring, weed control with SES and 2,4-D, winter mulching, irrigation, pest and disease control, picking, packing and marketing.

3639. KUPPUSWAMI, B. S.
Strawberry cultivation in Thambatti and Muttinad villages (Nilgiris District).
South Indian Hort., 1955, **3**: 50-2.

Commercial strawberry cultivation is only on a small scale, and peak production occurs between February and May. Moisture-retaining red loams are preferred for planting, which takes place during February and March. Flowers are removed until the end of the sixth month from planting. The plants crop for 3 years. Mulching with ferns helps to conserve moisture and to keep the fruit clean.

3640. STE-MARIE, C.-E.
Ce qu'il y a de nouveau dans le domaine de la fraise. (**New information on strawberries.**)
Agriculture, Quebec, 1955, **12**: 9-11, illus.

The chief centres of strawberry production in Quebec Province are near Montreal. The author considers that the low yields obtained are caused to some extent by planting on unsuitable or insufficiently prepared soils. Sénateur Dunlap is the main variety grown. In variety trials Valentine gave 2 pickings before Sénateur Dunlap was ready, and 60–70% of its yield was produced in the first 10 days. Louise and Tupper, 2 late varieties, reached their peak 7–10 days after Sénateur Dunlap. The picking season could be extended by greater use of early and late varieties.

3641. KRONENBERG, H. G., AND WASSENAAR, L. M.
Practijkproeven met aardbeirassen in 1952-1954. (**Practical trials with strawberry varieties in 1952-1954.**) [English summary 1 p.]
Meded. Inst. Vered. Tuinbouwgew. **63**, 1955, pp. 27, illus.

The results are surveyed of a series of national commercial trials with strawberry varieties and selections. Most varieties were satisfactorily vigorous; the number of flowers produced was no criterion of productivity. In appearance Bowa and Climax were the best; flavour was best with Deutsch Evern, Bowa, Climax, Senga 242, Macherauchs Frühernte and Senga 145. In general Macherauchs Frühernte, Regina and Selection 667 were considered the best.

3642. JORDAN, C.
Massnahmen zur Steigerung des Erdbeerertrages im ersten Nutzungsjahr. (**Methods of increasing strawberry yields in the first bearing year.**)
Gartenbauwiss., 1955, **1** (n.s.): 440-6, bibl. 3.

Three methods of obtaining increased yields from first year strawberry plants were investigated, using 5 varieties. Yields from plants set out before 1 September were higher than from those planted at the end of September. Close planting, at 24 plants per sq. m., gave yields corresponding to those of 2-year and older plants at normal spacing. The use of quickly developing varieties is advocated since they are more likely to react favourably to early planting.—Max-Planck-Inst., Züchtungsforsch.

3643. HITZ, C. W., CANN, J. P., AND HOLMBERG, B.
The control of strawberry runner growth by growth inhibiting chemicals.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 263-73, bibl. 18.

Growth inhibitors were applied to Temple strawberry plants late in the growing season in 2 years in an attempt to reduce late runner production without detriment to fruit bud differentiation. Sprays of maleic hydrazide applied when runners were elongating were very effective in retarding the growth of runners and the development of newly formed plants. They apparently had little effect on the vegetative vigour or fruiting behaviour of more mature plants. Effectiveness of the sprays was influenced by both time and concentration of applications. Sprays of dichloral urea were not effective in retarding runner growth and they caused a bronzing of the leaves of sprayed plants which persisted till the end of the growing season.—Univ. Delaware, Newark.

Vines.

(*See also* 3498g, q, u, 3618, 3673b, d, e, g, h, j, n-p, s.)

3644. LUCHINI, R.
La vitivinicoltura di Mendoza. (**Vine growing and wine making in Mendoza.**) [English summary 2 lines.]
Riv. Agric. subtrop., 1955, **49**: 116-32.

Following upon his general account of agriculture in Argentina [see *H.A.*, 24: 1] the author now gives detailed notes on viticulture, including varieties, in a single province. Figures are given for production in 1952 and 1953 of grapes, as also of peaches, apples, plums, pears, quinces, apricots, cherries, almonds, olives and walnuts.

3645. WILLIAMS, C. F.
Breeding perfect-flowered muscadine grapes.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 274-8, bibl. 1.

In crosses of muscadine grapes to obtain superior perfect-flowered varieties, Tarheel and Topsail were the most promising parents for vigour; and Tarheel, Thomas and Latham for resistance to black rot fungus. Fruits of seedlings with Latham as one parent had the highest total soluble solids, and those of seedlings with Duplin as one parent the best fruit size. Seedlings with Tarheel as the pollen parent had the best cluster characters but the smallest fruit size. Seedlings with Wallace and Willard as pollen parents were very susceptible to black rot leaf spot. Most seedlings of crosses with Wallace or Cape Fear as one parent had fruit of poor flavour. [Author's summary.]—N.C. agric. Exp. Stat., Raleigh.

3646. BREIDER, H.
Klonenzüchtung auf neuen Wegen. (**New methods of vine breeding.**) [English, French and Spanish summaries 7 lines each.]
Mitt. Klosterneuburg, Ser. A, 1955, **5**: 207-12.

The vine variety Silvaner, to which the wine of Franconia owes its reputation, is highly susceptible to spring and autumn frosts. Irradiation of selected plants with X-rays at dosages of 750–7,500 r. has so far produced two important mutations, a gigas form and a clone which matures its grapes and wood at an earlier date.

3647. ZULUAGA, P. A., AND ZULUAGA, E.
Segunda contribución al estudio de la biología floral de la vid en Mendoza. (**Second contribution to the study of the floral biology of the vine in Mendoza.**) [English and French summaries 13 and 12 lines.]
Bol. téc. Univ. nac. Cuyo **7** and **8**, 1954, pp. 1-47, bibl. 16, illus.

The floral biology of many varieties of *Vitis vinifera* was studied with a view to clonal selection of varieties subject to flower drop due to partial or total pollen sterility. A method of selection is proposed, based on relationships found to exist between the morphological and biological characteristics of the flowers. [For the previous paper see *H.A.*, 22: 3520.]

3648. BARRETT, H. C.
Some promising new grapes.
Trans. Ill. St. hort. Soc. for 1954, **88**: 135-8.

Notes are given on some varieties of French hybrid grapes which have shown promise in central Illinois for table and juice purposes. Thirty-one varieties are suggested as suitable for trial.

3649. JENNINGS, J. P.
Frost and vine growing in the Barossa.
J. Dep. Agric. S. Aust., 1955, **58**: 389-92, illus.

A list of varieties grown in the Barossa is given in order of bud burst date. The ability of varieties to recover from frost damage has also been studied. Mataro and Cabernet Sauvignon are the safest varieties to plant in frost areas on account of their late bursting and good recovery ability. Cultural methods which reduce frost hazard are the use of high (3 ft.) trellises, irrigation just before bud burst, and completion of the main spring cultivations before bud burst.—Gvt Vitic. Stat., Nuriootpa.

3650. Poux, C.
Sur une constante physiologique dans deux variétés de fruits de *Vitis vinifera.* **(A physiological constant in two varieties of *Vitis vinifera.*)**
C.R. Acad. Agric. Fr., 1955, **41**: 422-5.

The following data are tabulated for the vine varieties Carignan and Aramon over a period of 5 years: the weight of 100 berries at various dates, the titration acidity of the same samples, the ratio between these 2 figures, and the maximum seasonal value of this ratio. The maximum value of the ratio was remarkably constant, in spite of very different weather conditions in the different years.

3651. Vega, J., and Fox, J. M.
Determinación de expresiones vegetativas en vid y su aplicación en el análisis de ensayos culturales. **(Determination of growth expression in the vine and its application in the analysis of cultural trials.)**
Bol. téc. Univ. nac. Cuyo **9**, 1954, pp. 28, bibl. 6.

Branas and his colleagues [*H.A.*, 8: 1018, 15: 1516, 15: 1525 and 16: 1691] recognized 3 coefficients of growth expression in the vine, namely, weight of wood produced, weight of fruit, and sugar content of fruit or alcohol content of wine. These concepts were tested in Mendoza province in 1949/53 in cultural trials on the Malbeck and Aramon varieties. The average area of the 6th leaves from the base of primary fruiting shoots was found to be a better index of growth than the weight of shoots removed in pruning.

3652. Cabral, M. C. de M.
Quelques essais sur l'enracinement de boutures de porte-greffes. **(Some experiments on rooting vine rootstock cuttings.)**
Bull. Off. int. Vin, 1955, Vol. **28**, No. 289, *Suppl.* pp. 57-60.

Eleven varieties were studied in 1948/49. In 1949 the average percentage rooting in 10 varieties immersed in water or 25% purin for 2–15 days was 72 and 67 respectively, compared with 59 in the controls; rooting was better and the plants were sturdier when purin was used. The treatment recommended is immersion of the lower third of the cuttings in 25% purin for 3–4 days.—Posto vitivinicola de Dois Portos.

3653. Almeida, C. R. Marques de, and da Costa e Sousa, O. M.
Une nouvelle méthode pour stimuler l'enracinement. IV. De la stase du transport auxinique et de l'enracinement.* **(A new method of stimulating rooting. IV. Auxin blockage and rooting.)**
Bull. Off. int. Vin, 1955, Vol. **28**, No. 289, *Suppl.* pp. 61-4, No. 290, *Suppl.* pp. 65-7, bibl. 3.

In experiments in 1952 1-year-old stem cuttings of 3 vine varieties previously stored for 8 days at 3–4° C. were kept in the dark in a saturated atmosphere for 2–18 days to induce auxin blockage. Treatment increased root weight in 2 varieties, the highest root weight being given by 2 days in one case and by 4 in the other. [See *H.A.*, 23: 70.]—Inst. sup. Agron., Lisboa.

3654. Harmon, F. N.
A modified procedure for green-wood grafting of Vinifera grapes.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 255-8, bibl. 1, illus.

The modified procedure for green-wood grafting described in this report consists of placing the green-wood scion on the 1-year-old wood of the rootstock cutting during midseason of the first or root-forming year. Rootstock cuttings planted in nursery rows in the spring and grafted with green-wood scions weekly from 1 July to 12 August produced 84–98% successful grafts. Where 32 g. or more of rootstock top growth had been produced per vine at grafting time, the grafts were generally successful. The rootstocks successfully grafted during July matured an average of 17 g. scion wood per plant and in a single season produced vines suitable for field planting.—U.S. Dep. Agric., Fresno, Calif.

3655. Antcliff, A. J.
A disbunching experiment on the sultana.
J. Aust. Inst. agric. Sci., 1955, **21**: 106-7, bibl. 3.

The effect of the existing crop on fruit bud formation was studied in sultanas at Merbein by stripping vines of their bunches once only on different dates a month apart from mid-November, 1949, to mid-February, 1950, control vines being left to mature their crop in March. The last two disbunchings produced the same number of fruitful shoots in 1950–51 as the control. Disbunching in November and December resulted in the formation of more fruitful shoots than the control, but only in the case of the former was the increase significant. Green weights of fruit per vine showed greater responses to disbunching, but the 1950–51 yield, even from the earliest disbunching, did not approach what could have been obtained from the vines in 1949–50. It is concluded that the current season's crop is by no means the only factor affecting fruit bud formation and yield for the following season.—C.S.I.R.O., Merbein, Victoria.

3656. Kobayashi, A., Hosoi, T., and Isoda, R.
Growth and yield of grapes as related to the concentrations of nitrogen, phosphoric acid and potassium in sand culture. I. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **23**: 214-20, bibl. 3.

The optimum N, P_2O_5 and K contents for shoot length, top and root weight, and fruit yield, colouring and sugar content of fruit are given for non-bearing and bearing Delaware vines grown in sand culture. Conclusions are: (1) bearing vines required more P_2O_5 and K and less N than non-bearing vines; (2) increasing P_2O_5 gave an increased number of berries and hence greater weight per cluster; (3) increasing K gave an increased fruit/foliage weight ratio up to a certain point beyond which yield and leaf growth fell; (4) optimum N, P and K concentrations were 2·28–2·75, 0·21–0·24 and 1·50–1·73% respectively for non-bearing vines and 2·23–2·61, 0·30 and 2·10% respectively for bearing vines.

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* Being part of a series of papers on the polar transport of auxins.

3657. Beattie, J. M., and Forshey, C. G.
A survey of the nutrient element status of Concord grapes in Ohio.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 21-8, bibl. 2.

Samples were taken from 56 vineyards in Ohio to determine the relationship between yield and grape leaf petiole contents of N, P, K, Ca, Mg, Mn, Fe, B, Cu, and Zn. The average concentrations of N and K in the petioles were found to decrease as the average yields decreased, the correlations being significant. The average concentration of Mg in the petioles increased as the yield decreased, the negative correlation being significant. The average concentrations of Ca and P were not consistently associated with yield; however, vineyards in which the leaf petioles contained less than certain minimum concentrations of these elements did not produce the 3·5 tons p.a. considered necessary for profitable grape production. Mn was the only micronutrient of which positive deficiency symptoms were observed, and analyses showed that Mn deficiency could be expected to occur when the July petiole content fell below 30 p.p.m. The analyses suggest that the concentrations of macro-nutrients necessary to obtain a yield of 3·5 tons p.a. are as follows: 0·77% N, 0·14% P, 2·00% K, 0·70% Ca, 0·15% Mg. The relationship between high K-low Mg status and high yield was pointed out and discussed.—Ohio agric. Exp. Stat., Wooster, and Ohio St. Univ., Columbus.

3658. Negrulj, A. M., and Asriev, E. A.
The distribution of phosphorus when applied to the foliage. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 3, pp. 30-3, bibl. 5, illus.

P^{32} labelled superphosphate solutions, at various concentrations, were applied to individual vine leaves and the translocation of P into the different organs of the shoot was studied. P was found in all parts of the shoot including the phloem and xylem, and always occurred in larger quantities above the treated leaf than below it.

3659. Dobroljubskiĭ, O. K., and Slavvo, A. V.
The effect of root application of the microelements zinc and cobalt on the yield and chemical composition of the vine. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **100**: 583-6, bibl. 11.

Solutions of zinc and cobalt sulphates were applied on 30 May, 1953, to the roots of vines receiving no other fertilizer treatment. The rates used were 0·01–3·0 g. zinc sulphate and 0·001–0·2 g. cobalt sulphate per plant, dissolved in 1 l. water. All the Zn treatments, with one exception, increased the weight, volume and sugar content of the berries and reduced their acidity. The effect of Co treatments was more variable, the best results being produced by 0·05 g. per plant. The 2 lowest rates of Co (0·001 and 0·005 g.) had no noticeable effect, and the highest rate (0·2 g.) slightly reduced both the weight and volume of berries. Successful autumn applications of 3 g. zinc sulphate and 0·1 g. cobalt sulphate are also mentioned, and it is considered that even better results might be obtained by applying the microelements in combination with normal fertilizer treatments.

3660. Dobroljubskiĭ, O. K., and Slavvo, A. V.
The action of zinc and cobalt compounds. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 4, pp. 37-9, bibl. 6.

Sprays of $ZnSO_4$ and $CoSO_4$ at various concentrations were applied to the inflorescences of the vine variety Aligote 3–4 days before full bloom. All treatments improved yields, increased the sugar and reduced the acid contents as compared with the controls. The best results were obtained with $ZnSO_4$ at 0·005% and $CoSO_4$ at 0·00002% concentrations.

3661. Vnukova, A. S., and Ryža, V. K.
The role of manganese and boron compounds. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 3, pp. 33-5.

Borax at 2·6 g. and manganese sulphate at 10 g. in 3 l. water per vine were applied separately and together in the spring simultaneously with normal NPK treatment. NPK+borax+$MnSO_4$ gave the best results, as measured by reduced drop of young berries, sugar content and weight of berries, weight of bunches and yield per plant. In the separate applications of the microelements, NPK+B was more effective than NPK+Mn.

3662. Poliščuk, A. D.
The effect of manganese and boron on the growth of vine seedlings. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 3, pp. 35-6.

B and Mn were applied to seedlings of 3 varieties of vine in 500, 780 and 1,000 mg./l. concentrations at the rate of 3 l. per row metre on 22 June, 14 July and 14 August. All treatments improved both growth and wood maturity as compared with the controls, in general concentrations of 500 mg./l. Mn and 1,000 mg./l. B giving the best results. Results are tabulated in detail. It was also found that in the northern Ukraine it is better to sow vine seed (stratified) in the spring, end of May, than in the autumn.

3663. Ceĭko, A. I.
Irrigation of vineyards in the steppe region of the Crimea. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 4, pp. 28-31, bibl. 1, illus.

Data are given on the results of irrigation trials carried out in a 3-year-old vineyard, with water supplied from artesian wells and applied in the furrow. The highest yield, i.e. 23·8 centners per ha., was obtained with 4 applications totalling 2,700 m^3/ha. One and 2 applications, supplying 800 and 1,500 m^3/ha. respectively, produced about equal yields of some 21 centners per ha., while from the control plot only 19 centners per ha. were harvested. The most effective irrigation treatment appeared to improve wine quality.

3664. Depardon, L., and Buron, P.
Cultures agricoles sur défrichement de vigne. **(Agricultural crops on old vine soils.)**
Ann. agron., 1955, **6**: 161-7, bibl. 8.

Failure of cereals on old vine soils was shown to be due to deficiencies in nitrogen and organic matter and to an acid soil reaction caused by years of sulphur application. Liming and raising the organic matter content of the soil by stable manure and green manuring, as well as high applications of mineral nitrogen to the cereal crops, is recommended for areas where it is the practice to intercrop vines with cereals. Copper residues did not reach a toxic level. [See also *H.A.*, 25: 2556.]

3665. Moser, L.
Rebholde und rebfeindliche Pflanzen. **(The ecological compatibility of certain plants with vines.)** [English, French and Spanish summaries 8 lines each.]
Mitt. Klosterneuburg, Ser. A, 1955, **5**: 213-23.

Long observation has shown that some weed plants are harmful to vines, while others are actually beneficial. The author also found that in vineyards a permanent plant cover plus irrigation is preferable to clean cultivation, especially on steep slopes and in combination with the high trellising system advocated by him. A list is presented of indigenous plants which in association may form a low permanent cover with modest nutrient and water requirements.

3666. Ournac, A.
Teneur en acide ascorbique des différentes parties du raisin (jus, pulpe, pellicule, rafle). **(The ascorbic acid content of different parts of the grape berry: juice, pulp, skin, stalk.)**
Ann. Tech. agric., 1954, **3**: 231-9, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1357.

Figures are given for white and red grapes. During ripening the content of ascorbic acid tended to diminish in the stalk and juice and to increase in the skin.

3667. French, B. C., and Sammet, L. L.
Wage plans in grape packing.
Calif. Agric., 1955, **9** (6): 2, 15.

Six different systems of paying packers, one based on piece work, two on hour work and three combining these two methods, were compared for 3 grape varieties in 24 packing houses. The results emphasize the value of piece-work systems in reducing costs per box and in increasing the earnings of packers. An attempt to determine the effect of the system on quality gave inconclusive results.—Univ. Calif., Berkeley.

3668. Kruijk, P. A.
Het koelen van druiven. **(Cold storage of grapes.)**
Jaarversl. Proefstat. Groent. Fruit. Glas, Naaldwijk, 1954, pp. 69-73, illus.

Precautions in the greenhouse which will improve storage quality include good ventilation, moderate N and Ca manuring, sufficient thinning, no further watering after the berries start to colour, and cutting back the shoots by 30 cm. 14 days before harvest. A high sugar content generally results in better storage. In the cold store the R.H. should start at 90% and be raised to 92–95% a few weeks later; the temperature should be kept as close to 0·5° C. as possible.

3669. Malan, H.
Can the use of moisture proof wrappers improve the condition of grapes during long-term storage?
Fmg S. Afr., 1955, **30**: 231-2, 236.

Storage tests were made with Barlinka and Waltham Cross grapes packed in pliofilm, cellophane, greaseproof paper and ordinary sulphite paper. The samples were stored for periods of up to 6 months at 31° F. in an atmosphere containing 20 p.p.m. of sulphur dioxide. Fungal wastage was high in bunches wrapped in pliofilm and cellophane. When these materials were used as box liners wastage was only slightly higher than in the controls. Greaseproof paper samples were as good as the controls.—West. Prov. Fruit Res. Stat., Stellenbosch.

3670. Cordonnier, R.
Recherche de l'addition frauduleuse d'aromatisants aux vins doux naturels. Observations sur le parfum naturel de ces vins. **(An investigation into the fraudulent addition of aromatic substances to natural sweet wines. Observations on the natural aroma of these wines.)**
Progr. agric. vitic., 1955, **144**: 3-9, bibl. 7.

During investigations into colour reaction and chromatographical methods for the detection of artificial aroma in sweet wines (due to adulteration with small quantities of coriander seed or elder flowers), the substances responsible for aroma in unadulterated wines were studied. These substances did not appear to be esters, alcohols or fatty aldehydes, but were probably terpenic compounds or aromatic aldehydes originating in the fruit.—Éc. nat. Agric. Montpellier.

Nuts.

(*See also* 3509, 3554, 3673a, f.)

3671. Kester, D. E., and Jones, R. W.
Small-nut almonds.
Calif. Agric., 1955, **9** (8): 6, illus.

Efforts are being made in California to develop almond varieties or strains that will consistently yield large crops of small-sized nuts which are needed by the processing industry. Characteristics of nuts and kernels from promising selections under test in various localities are tabulated and illustrated.

3672. Brierley, W. G.
Effects of hormone and warm temperature treatments upon growth of black walnut root grafts.
Reprinted from *The Nutshell*, 1955, **7** (2): 6-8, bibl. 4, as *Pap. sci. J. Ser. Minn. agric. Exp. Stat.* **3322.**

A number of walnut root grafts, varieties Allen and Cochrane, were treated with Hormodin No. 2, while others were used as untreated controls. The grafts were treated in 3 different ways, namely: (*a*) packed in moist sawdust in a warm greenhouse (air temperature 65–80° F.); (*b*) packed in moist sawdust in a nursery cellar (air temp. 41–56° F.); and (*c*) lined out immediately in a nursery row (air temp. 41–72° F.). It was apparent that the relatively low temperatures in the nursery cellar, and during the early season in the nursery row, were not favourable for bud development, callus growth and formation of the graft union. Treatment with the hormone had no effect at these temperatures. Under the warm greenhouse conditions there was a high percentage of success. Hormodin No. 2 treatment resulted in better callus growth and root development, though there was little indication of difference in percentage take between treated and control grafts.

Noted.

3673.

a ADAMOVIČ, E. I., AND NORIN, B. N.
The resin secretion system of *Pistacia vera.* [Russian.]
Bot. Žurnal, 1954, **39**: 894-901, bibl. 6, illus.

b AĬVAZJAN, P. K., AND KOSTJUK, A. N.
Inheritance of characters in the first generation of intraspecific crosses of vine. [Russian.]
Agrobiologija, 1954, No. 6, pp. 51-6, illus.
Intervarietal crosses of some European vines.

c ANON.
Een nieuwe aardbeisoort: Holstein. (**A new strawberry variety: Holstein.**)
Cult. Hand., 1955, **21**: 280.
Bears twice yearly, starting in its first year.

d COSMO, I., COMUZZI, A., AND BORDIGNON, S.
Indagini sulla ricostituzione viticola delle Venezie . . . in provincia di Vicenza a decorrere dal 1925. Quarto e . . . quinto contributi. (**Studies on vineyard reconstruction in the province of Vicenza since 1925. Fourth and fifth contributions.**) [English summaries 8 lines each.]
Ann. Sper. agrar., 1955, **9**: 713-32, bibl. 3, 733-61.

e COSMO, I., AND POLSINELLI, M.
"Raboso veronese." (**Raboso veronese.**) [English summary 9 lines.]
Ann. Sper. agrar., 1955, Vol. **9**, No. 4, Suppl. pp. xci-cii, bibl. 9, illus.
A white wine grape variety of N.E. Italy.

f GLENN, E. M.
A good walnut will bear for a hundred years.
Grower, 1955, **43**: 1524-7, illus.
Walnut growing and notes on 5 varieties for English conditions.

g HALL, E. G.
Review of the use of sulphur dioxide in the storage and shipping of grapes.
Fruit World, Melbourne, 1955, **56** (5): 9-11.

h HATTON, T. T.
Growing bunch grapes.
Ext. Circ. N.C. agric. Ext. Serv. **311,** revised 1954, pp. 8, illus.

i HATTON, T. T.
Small fruit culture for home gardeners.
Ext. Circ. N.C. St. Coll. Agric. **333,** revised 1954, pp. 8, illus.
Strawberries, dewberries and raspberries.

j HINRICHS, H. A.
A summary of grape variety trials in Oklahoma.
Bull. Okla agric. Exp. Stat. **B-448,** 1955, pp. 19.

k HOFFMAN, M. B.
Strawberry growing.
Ext. Bull. Cornell agric. Exp. Stat. **923,** 1954, pp. 40, illus.
Nothing on disease or pest control.

l JOINT COMMITTEE.*
Specification of desirable characteristics of soft fruits for canning, quick freezing and jam manufacture.
[*Mimeo. Publ.*], 1955, pp. 3.
On strawberries, raspberries and black currants.

m LAHTIONOV, A. F.
Better strawberry varieties for the Maritime Province. [Russian.]
Sad i Ogorod, 1955, No. 6, pp. 55-7, illus.
A description of 7 varieties for the Far East.

n LOOMIS, N. H., WILLIAMS, C. F., AND MURPHY, M. M.
Inheritance of flower types in muscadine grapes.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 279-83, bibl. 14.
Selfed and crossed hermaphrodites.

o DE MOS, D.
Prof. Aberson. [Dutch.]
Meded. Proefstat. Groent. Fruit. Glas, August 1955, p. 2.
An early white grape variety.

p PESTANA, A.
L'Avesso: variété de raisin blanc d'une remarquable qualité pour la production des vins Verdes. (**Avesso: a fine-quality white grape used for making Verde wines.**)
Bull. Off. int. Vin, 1955, Vol. **28**, No. 291, *Suppl.* pp. 76-84.
The Verde table wine district is in northwestern Portugal.

q POWERS, L.
Inheritance of period of blooming in progenies of strawberries.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 293-8, bibl. 3.

r RITCHIE, J. C.
A natural hybrid in *Vaccinium.* I. The structure, performance and chorology of the cross *Vaccinium intermedium* Ruthe.
New Phytol., 1955, **54**: 49-67, bibl. 35, illus.

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* Formed from Panels of the Brit. Food Manuf. Industr. Res. Ass., Randalls Road, Leatherhead, Surrey, and of the Fruit and Veg. Canning and Quick Freezing Res. Ass., Chipping Campden, Glos.

s RODRIGUES, A.
Sur la variabilité des valeurs des coordonnées phyllométriques par rapport aux différents points de la feuille et aux différents niveaux du sarment. **(On the variability of the values of the phyllometric coordinates in relation to different points of the leaf and to different positions on the shoot.)**
Bull. Off. int. Vin., 1955, Vol. **28**, No. 292, *Suppl.* pp. 93-106, bibl. 5.
In the Madeira varieties Bastardo, Malvasia Candida and Verdelho.

t SCOTT, D. H.
The strawberry variety situation in eastern United States.
Trans. Ill. St. hort. Soc. for 1954, **88**: 138-45, map.
New varieties and production of virus-free stock.

u TURNER, D. H.
The cultivation of strawberries.
Bull. Edinb. Coll. Agric. **47**, 1954, pp. 24-32.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3616h, 3626, 3638, 3807l, z, 3808b, 3844-3849, 3864, 3881, 3884-3886, 4461, 4487i.)

3674. CHAMBERLAIN, G. C., AND DUSTAN, G. G.
Diseases and insect pests of stone fruits in Canada.
Publ. Canada Dep. Agric. **915**, 1954, pp. 45, illus.

Information is given on symptoms, injury, control, etc., regarding 15 bacterial, fungal, virus and non-parasitic diseases and 30 insect pests.

3675. DICKER, G. H. L., AND KIRBY, A. H. M.
Report on a visit to Canada to study new trends in pest and disease control on fruit, June-August 1954.
[*Publ.*] *agric. Res. Coun.* **ARC.226/55**, [1955], pp. 34.

The Canadian situation in pest and disease control of top fruit is reported on, with special reference to recent work on the possibility of harmonizing biological and chemical control. Proposals are made for future research on these lines in England.

3676. ASSOCIATION OF APPLIED BIOLOGISTS (BROWN, W., AND OTHERS).
Proceedings of the Jubilee Meeting held in London, 13-17 September, 1954.
Ann. appl. Biol., 1955, Vol. **42**, pp. 414, bibls, illus.

At the Jubilee Meeting, held to commemorate the foundation of the Association of Applied Biologists in 1904, eminent British and foreign scientists reviewed progress in a wide field of subjects connected with crop protection. The papers read included the following, among other, topics: *International co-operation in the field of crop protection*, 3 papers by W. C. Moore, V. E. Wilkins and E. Gram; *Insect pests of stored products*, 3 papers by D. W. Hall, F. R. Cann and E. A. Parkin; *Plant viruses and virus diseases*, 4 papers by K. M. Smith, E. van Slogteren, F. O. Holmes and F. C. Bawden; *Plant growth-regulating substances*, 4 papers by R. L. Wain, H. Burström, W. G. Templeman, and L. J. Audus and K. V. Symonds; *Soil-borne pests and diseases*, 3 papers by S. D. Garrett, J. Rishbeth and J. Doeksen; *Crop protection*, 4 papers by H. Martin, A. E. Dimond and J. G. Horsfall, W. E. Ripper and E. Holmes; *Forecasting and assessment of plant diseases*, 3 papers by K. S. Chester, E. C. Large and D. H. R. Lambers; *Plant nematodes*, 3 papers by B. G. Peters, F. G. W. Jones and P. Bovien.

3677. DE FLUITER, H. J., AND OTHERS.
Discussiedag over ziekten en gezondheidsselectie bij aardbeien. **(Discussion day on diseases and health selection in strawberries.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 449-79, illus.

"Discussion Day" was held at Wageningen on various problems of clonal selection in strawberries. The following articles are included: Strawberry viruses and methods of producing virus-free stocks, by H. J. de Fluiter; Strawberry nematodes, by C. H. Klinkenberg; June yellows, by L. M. Wassenaar; Nematode control in the field by spraying, by G. T. op't Hoog; Control of nematodes by fumigation, by P. H. van de Pol; Practical experience with fumigated plants, by M. Bok; and Experience with selected stock in the field, by M. Bok.

Disturbances of genetic origin.

3678. WILLIAMS, H.
June yellows: a genetic disease of the strawberry.
J. Genet., 1955, **53**: 232-43, bibl. 17.

The June yellows of strawberries is a spontaneous variegation which occurs only in certain clones. The change from normal to variegated is confirmed as a genetic one. It appears that variation in severity of the variegation of a plant is accompanied by variation in the transmission of variegation to seedlings, and that green plants vary genetically also. It is suggested that the disease is caused either by a high concentration of a rogue plasmagene or else by a low concentration of a normal plasmagene necessary for chlorophyll production. A possible method of control of the disease in susceptible varieties is outlined. [This method would require a test by which low-likelihood green plants could be distinguished from high-likelihood plants, and this would be followed by selfing selected stocks of the former and scoring their seedlings.] [Author's summary.]—John Innes hort. Instn.

3679. WILSON, D. J.
The effects of transient yellows and streak in Auchincruive Climax strawberry.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 86-7, bibl. 1.

Climax strawberry runners taken from parents that had shown transient yellows produced plants which were very variable in size and which yielded less than half the crop produced by runners taken from normal plants. Runners taken from parents that had shown both transient yellows and streak produced stunted plants which yielded less than 25% of the crop produced by runners from normal plants.

3680. BRAAK, J. P.
Effect of some environmental factors on the appearance of "June Yellows" in strawberries and its significance for the development of a test method. [Dutch summary.]
Euphytica, 1955, **4**: 189-96, bibl. 5.

An investigation of the climatic factors favouring the appearance of yellows has been started. In apparently normal plants of Climax and Blakemore symptoms of "transient yellows" and "streak" were induced by growing them at 5° C., with artificial light of about 7,000 lux for a minimum of 12 hours per day. In plants originally grown at a relatively low temperature, the maximum effect was reached in about 2 months. Plants originally grown in a relatively high temperature needed about 3 months for the maximum effect to be obtained.—Inst. Vered. Tuinbouwgew., Wageningen.

Disturbances of nutrition or of unknown origin.

(*See also* 3580, 3581, 3807a, m.)

3681. MATLOCK, D. L., AND CHILDERS, N. F.
Investigations of an apple leaf chlorosis.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 52-60, bibl. 17, illus.

The cause of a leaf chlorosis resembling Mn deficiency was studied on Twenty Ounce apple trees growing on sandy loam in New Jersey. Analysis of the chlorotic leaves showed a deficiency level of Mn, but Mn treatments gave no response, even though the leaf content of Mn was raised 10-fold or more. Leaf sprays, dips or injections of Mg, B, Zn or urea also had no effect on the chlorosis. In greenhouse studies with soil taken from under the chlorotic trees, lettuce used as indicator plants showed a marked response to lime, which raised the pH from 4·4–5·3 to 6·5. It is thought that the apple tree chlorosis may have been associated with poor root development and/or poor absorption of certain nutrients due to low soil pH condition.—Rutgers Univ., N. Brunswick, N.J.

3682. CAIN, J. C.
Blueberry chlorosis in relation to leaf pH and mineral composition.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 61-70, bibl. 22, illus.

Data are presented showing a relationship between blueberry leaf chlorosis, the accumulation of the basic cations Ca, Mg, and K, and an increase in the pH of the leaf tissue. Injections of mineral acid and ammonium salts caused greening of chlorotic leaves which were chlorotic as a result of a lack of ammonium ion in the nutrient solution [see *H.A.*, 23: 296]. The iron content of chlorotic leaves, except when produced in —Fe culture, is frequently higher than that of corresponding green leaves. It is shown that the symptoms produced by accumulated basic cations concurrent with increased leaf pH, those of iron deficiency, those induced by the heavy metal cobalt, and those commonly occurring on calcareous soils are visibly identical. It is suggested that the chlorosis may result from the very low solubility of the ferric ion at the pH value observed. However, the effect of heavy metals, the fact that other plants utilize iron under soil pH conditions unfavourable for blueberries, and the possibility of a specific low pH optimum for the blueberry enzyme mechanism involving iron lend weight to the hypothesis that an enzyme system involving iron is inactivated by the various causes of the chlorosis, i.e. lack of iron, high tissue pH, and the presence of certain heavy metals. Further work in this field is suggested. [Author's summary.]—N.Y. St. agric. Exp. Stat., Geneva.

3683. SHANNON, L. M.
Internal bark necrosis of the Delicious apple.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 165-74, bibl. 27, illus.

Sand culture experiments with Delicious scions grafted on M. VII rootstocks were carried out in order to study the relative influence of the various physiological factors which have been suggested as causes of internal bark necrosis, namely B deficiency and excess of Mn, Fe or Al. Substrates receiving no B and those receiving above-normal concentrations of Mn (50 p.p.m.) significantly increased the number of trees showing internal bark necrosis. Substrates receiving above-normal concentrations of Fe (50 p.p.m.) induced the disorder, but the number of trees showing the disorder was not significantly increased. Substrates receiving above-normal concentrations of Al (30 p.p.m.) failed to induce bark necrosis. The severity of the necrosis was greatest in trees receiving high Mn. High concentrations of Fe in combination with deficient B reduced the severity of the disorder. Histological studies showed that internal bark necrosis resulting from B deficiency and from above-normal concentrations of Mn and Fe exhibited the same basic manifestations. Necrotic areas appeared to originate in the cortex and phloem and soon became surrounded by a cork cambium. Elevations of the epidermis were the first externally visible manifestations, followed by small irregular lesions in the bark.—Rutgers Univ., N. Brunswick, N.J.

3684. WOODBRIDGE, C. G.
The boron requirements of stone fruit trees.
Canad. J. agric. Sci., 1955, **35**: 282-6, bibl. 9, illus.

A study was made of the syndromes associated with boron deficiency and excess on peach, apricot, prune, and cherry trees grown in sand culture. On the four types of fruit trees examined boron deficiency was characterized by a spring die-back of branches. Symptoms of toxicity varied considerably: on peach, brown necrotic marks on the underside of the main rib of the leaf were most characteristic; on apricot, swelling of the nodes; on prune, cracking and sloughing off of bark on 2-year-old twigs; and on cherry, die-back of terminals accompanied by gumming. Results of chemical analyses indicated that there was a close relationship between the boron content and expression of tree symptoms. [Author's abstract.]—Canada Dep. Agric., Summerland, B.C.

3685. MONT, R. J.
Boron deficiency symptoms in raspberries.
N.Z. J. Sci. Tech., Sect. A, 1955, **36**: 610-13, bibl. 1, illus.

A raspberry dieback in the Nelson district was diagnosed as boron deficiency [*H.A.*, 22: 265]. To confirm this diagnosis raspberries were grown in sand culture with low boron supplies. Symptoms, of which the most characteristic was a feathery appearance of the leaves, are described.—Cawthron Inst., Nelson.

3686. Beyers, E.
Effect of fertilizers on composition of grape leaves, with special reference to magnesium deficiency.
Sci. Bull. Dep. Agric. S. Afr. **353,** 1955, pp. 11, bibl. 16, illus., 3d.

Ammonium sulphate increased N, Mg and Mn in the leaves and reduced the uptake of K. Superphosphate increased leaf P but had no significant effect on the other elements analysed. Potassium sulphate increased the uptake of K, Mn and Fe, and decreased that of N, Ca and Mg. Evidence is presented showing that a chlorotic disorder in the K-treated plots was due to Mg deficiency induced by K applications. Applications of ammonium sulphate markedly increased the Mn uptake. The Mn content of the grape leaves was much higher than that of peach leaves on the same soil. [Author's summary.]—Western Prov. Fruit Res. Stat., Stellenbosch.

3687. McClung, A. C.
The occurrence and correction of zinc deficiency in North Carolina peach orchards.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 75-80, bibl. 11.

In a leaf analysis survey of North Carolina peach orchards zinc deficiency was found in all orchards where Zn content of mid-shoot leaves sampled in August was below 6·0 p.p.m. It was found that one-fourth of the samples with from 6·0 to 18·0 p.p.m. Zn were from chlorotic orchards, and that above 18·0 p.p.m. only one sample out of 59 was from an orchard with the chlorosis. The mean Zn content for all samples from orchards with chlorosis was 10·3 p.p.m. as compared with 19·2 p.p.m. for orchards without chlorosis. Survey data showed a decline in Zn content of leaves and an increase in the occurrence of the chlorosis over the years 1950–1952. The almost complete change from a lead arsenate-zinc sulfate program for insect control to a schedule containing organic compounds without Zn is suggested as one possible reason for these changes in Zn status. Foliar Zn sprays were much more efficient in the correction of the chlorosis than were soil applications or dormant sprays. [Author's summary.]—N.C. St. Coll., Raleigh.

3688. Clark, P. G., and Hey, G. L.
Cox spot makes a strong new attack.
Grower, 1955, **44**: 222-3, illus.

Cox spot is an abnormal condition of Cox's Orange characterized by dead, brown, circular or irregular areas on the leaves; badly affected leaves drop. The condition has been known for a decade but has been particularly serious in 1955. Investigations showed that the trouble was not caused by spray treatments. Post-blossom sulphur sprays greatly reduced the incidence of Cox spot, but no other spray materials used did so. There seemed to be no relationship between the incidence of Cox spot and any visible symptoms of mineral deficiency, but in some cases starved trees were less seriously affected than well nourished trees. Blotching of a very similar character has been observed on Allington Pippin, Bramley, Laxton's Superb and Warner's King apples and on Comice pears.

3689. Tukey, R. B., Klackle, R. L., and McClintock, J. A.
Observations on the uncongeniality between some scion varieties and Virginia Crab stocks.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 151-5, bibl. 11.

An uncongeniality has recently been observed between Virginia Crab stock and certain scion varieties in Illinois, Indiana, Michigan, New Jersey and Ohio. Some of these varieties were formerly considered congenial. The degree of uncongeniality varies between varieties and between trees of a given combination, and increases with age. The symptoms of severe uncongeniality are: dwarfed trees, low vigour, tendency to lean, downward habit of growth, precocious bearing and smaller, inferior fruit. This uncongeniality is expressed in the Virginia Crab wood as irregular growth rings and a pitting of the xylem greatly resembling that found in tristeza disease of citrus. Such a situation suggests the possibility of the presence of a virus in certain varieties of apple which is expressed when these varieties are grafted onto Virginia Crab. If this proves to be the case, Virginia Crab may serve as a useful indicator plant for certain latent apple viruses. [See also next abstract.]—Purdue Univ., Lafayette, Ind.

3690. Miller, V. J.
A trunk disorder of Virginia Crab interstocks.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 159-64, bibl. 7, illus.

Growth measurements have shown that the trunk diameter of Virginia Crab interstocks topworked with Golden Delicious, Delicious and Winesap was significantly smaller than that of Hibernal interstocks worked with the same varieties. There was no significant difference in size between the 2 interstock varieties when topworked with Jonathan and Grimes Golden. Four years after topworking, splits up to 10 in. long were noticed in the bark of Virginia Crab worked with Golden Delicious and Red Delicious. These splits continued to appear and finally were present on all the topworked Virginia Crab trees, whereas no unworked tree developed any cracks. It is concluded from these and further observations that Virginia Crab interstocks are suffering from some disorder, the principal symptoms of which are: (1) reduced growth of the plant as a whole; (2) longitudinal splits in the bark of the interstock; and (3) irregular growth of the cambium producing a ridged surface of the wood of the interstock. This condition appears to be the same as that described by Tukey, Klackle and McClintock [see previous abstract]. The condition appears shortly after topworking with some varieties and becomes progressively worse. It has not been found to occur in any of 17 other interstock varieties examined.—Univ. Neb., Lincoln.

3691. Mosse, B.
Symptoms of incompatibility induced in a peach by ring grafting with an incompatible rootstock variety.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 76-7, bibl. 5, illus.

A description is given of the growth of Hale's Early peach on Brompton rootstock, ring-grafted with Myrobalan B in the rootstock stem, and of the histology of the unions and of the tissues derived from the bark rings. The development of clearly localized structural abnormalities in tissues derived from the initially well-established bark rings suggests a specific reaction between these Myrobalan rings and the Hale's scion. The fact that these two species were separated by about 6 inches of apparently normal Brompton stem suggests that the reaction is due to a graft-transmissible toxin or virus.

3692. Brase, K. D., and Parker, K. G.
Decline of Stanley prune trees.
Plant Dis. Reptr, 1955, **39**: 358-62, bibl. 4, illus.

Prune trees propagated on Myrobalan rootstock (*Prunus cerasifera*) with a leaf symptom termed chlorotic fleck made reduced growth. The Stanley variety grown on such stock developed a constriction at the bud union. Orchard trees with a similar constriction in severe form are killed. It is suggested that the Stanley variety may sometimes contain a factor that is lethal to a rootstock affected by chlorotic fleck but that does not seriously affect a normal rootstock. [Authors' abstract.]—N.Y. agric. Exp. Stats, Geneva and Cornell.

Environmental or climatic factors.

(*See also* 3425-3429, 3498i, 3499a, b, h, 3514, 3549-3551, 3616p, 3649, 3807f, 4481, 4485.)

3693. Wishart, R. L.
Leaf rub markings on dried prunes.
J. Dep. Agric. S. Aust., 1955, **58**: 413-14, illus.

With the prune variety D'Agen, russet markings on the dried fruits were found to have been caused by mechanical injury, mainly leaf brushing, during the growing season. The injury was more severe when it occurred during the early part of the season. Similar markings were observed on Robe De Sargent, Splendour and Golden Drop.

3694. Anon.
La pourriture des Jonathan. **(Internal breakdown of Jonathan.)**
Fruit belge, 1955, **23**: 113-14.

Studies have been started at Gorsem on this storage disorder of Jonathan. Preliminary results show that factors affecting the incidence of breakdown are date of picking (late picking resulting in more breakdown than earlier picking) and storage temperature. Juice from affected fruits when injected into healthy fruits induced symptoms of breakdown.

3695. Slater, C. H. W., and Ruxton, J. P.
The effect of soil compaction on incidence of frost.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 88-91, bibl. 4.

Two short series of experiments are reported which confirm that on frosty nights the minimum air temperature immediately over uncultivated or compacted soil is higher than that over cultivated or loose soil. The effect decreased with height above the soil, and, except for the air very near to the soil surface, was further reduced when there was wind. [Authors' summary.]

3696. Edgerton, L. J.
Fluctuations in the cold hardiness of peach flower buds during rest period and dormancy.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 175-80, bibl. 6.

Twigs of Halehaven peach were collected during cold weather in December when the buds were in the rest period, and were held at 65° F. for periods of up to 7 days. Freezing tests made on this material showed that 4 days' exposure to such a temperature resulted in little or no loss in bud hardiness, while 7 days' exposure resulted in appreciable loss in bud hardiness. Twigs collected in February, after the rest period, showed an appreciable loss in hardiness after exposure to 65° F. for only 2 days. With twigs taken in April, however, when the buds were at the green calyx stage, the loss in hardiness following 2 days' storage at 65° F. was less marked than in samples taken in February. Freezing tests were also made on twigs collected from Halehaven, Golden Jubilee and Elberta trees in the orchard during periods of unseasonably mild weather in the late autumn. The data for these tests showed a loss in cold hardiness of resting flower buds if the period of mild weather is more than 3–4 days.—Cornell Univ., Ithaca, N.Y.

3697. Campbell, R. W., and Lingle, J. C.
Some effects of low temperatures on the flower primordia of the strawberry.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 259-62, bibl. 5, illus.

Plants of Blakemore and Premier were given various hardening treatments before being exposed to various freezing temperatures for a period of 14 hours. No significant varietal differences were found with respect to damage, inflorescence blighting or survival. The plants did not harden in the absence of light. They reached maximum hardness in 7 days when exposed to a 12-hour day and alternating temperatures of 32° and 55° F. Several different types of damage to flower buds were observed, namely (*a*) complete killing of the primordia, (*b*) differential killing of the flowers in the bud, (*c*) killing of the opened flower parts, (*d*) injury to part of the vascular tissue of the peduncle. Plants exposed to 12° F. sustained more damage than those exposed to 18° or 24° F. The danger point for mortality of hardened plants appeared to be 18° F. Plant mortality may occur as a result of injury to roots or vascular tissue.—Kans. agric. Exp. Stat., Manhattan.

3698. Brown, J. F.
Effect of various freezing temperatures on the behaviour of the strawberry plant.
Diss. Abstr., 1955, **15**: 13, being *Publ.* 10574 of 75 pp.

Fully hardened, dormant plants of Premier (Howard 17) were slowly frozen to various minimum temperatures in controlled cabinets. Such plants showed no apparent injury from freezing until the temperature had fallen to 21° F. At lower temperatures than this the injury was, in general, proportionate to the severity of the freezing. Death occurred at 14–15° F. Freezing reduced the ability of the plant to accumulate radioactive P from solutions bathing the roots or pipetted into the crown-bud. Invasion of the roots by soil organisms causing lesions of varying size and some necrosis was facilitated by freezing injury.

3699. BAIER, W., AND OTHERS.
Frostbekämpfung im Weinbau. **(Frost protection of vines.)**
Ber. dtsch. Wetterdienst., 1955, Vol. **2**, No. 15, pp. 35, bibl. 29, appendices pp. 397, maps.

This detailed survey of the frost problems of vine growers in Baden-Württemberg is the result of an energetic, co-operative effort, sponsored by the Ministry of Agriculture, to avoid a repetition of the catastrophe in the spring of 1953. Two hundred and twenty-four communities in the danger area were visited and mapped, and recommendations were worked out for each of these localities on the measures to be taken in the case of a late frost. The paper itself is a broad discussion of the methods employed in the survey, of its findings and of the principles of frost protection, direct and indirect. In conclusion a comparison is made of the merits, limitations and economics of fog or smoke production, heating and irrigation as protective measures. Of these irrigation requires the highest capital investment, but it combines maximum protection with minimum demands on manpower.

3700. EIDG. KOMMISSION ZUM STUDIUM DER HAGELBILDUNG UND HAGELABWEHR.
Schlussbericht der Eidg. Kommission zum Studium der Hagelbildung und der Hagelabwehr über den Grossversuch Nr. I zur Bekämpfung des Hagels auf der Magadinoebene (Tessin) 1948 bis 1952. **(Final report of the Swiss commission for the study of the formation and prevention of hailstorms on the large-scale trial No. I in the Magadino plain [Switzerland] 1948-1952.)** [French and Italian summaries ½ p. each.]
Landw. Jb. Schweiz., 1955, **4**: 269-90, being *Wiss. Mitt. eidg. Volkswirtsch. Dep., Abt. Landw.*, No. 7.

This large-scale, 5-year trial has shown unequivocally that under the conditions of the Magadino plain rockets, even of high explosive power, cannot be expected to prevent the formation of hailstorms. The reasons for failure are discussed. Valuable meteorological information has been gained. [In 1953 rockets were abandoned in favour of cloud seeding; see also *H.A.*, 19: 1911, 23: 389 and 3989, 25: 1442 and next abstract.]

3701. EIDG. KOMMISSION ZUM STUDIUM DER HAGELBILDUNG UND HAGELABWEHR.
Grossversuch II zur Bekämpfung des Hagels auf der Magadinoebene. 2. Versuchsjahr. Tätigkeitsbericht Nr. 7, 1954. **(Seventh annual report on the large-scale trials on the prevention of hailstorms in the Magadino plain [Switzerland] for 1954; 2nd year of trial II)**, 1955, pp. 41, plates and maps.

The late arrival of new equipment to be tested in 1954 shortened the season too much to permit of a statistical analysis of the results. Analyses of rainwater from seeded thunderstorms, however, showed a satisfactory silver content of the water. The new apparatus for generating AgI automatically is described and illustrated. [For a brief account of the first year of trial II see *H.A.*, 25: 1442.]

3702. KLUGE, K.
Verstärktes Auftreten von Walnüssen mit unentwickelten Schalen. **(Higher incidence of walnuts with defective shells.)**
Dtsch. Gartenb., 1955, **2**: 210-11, bibl. 5, illus.

At the Institut für Obstbau, Marquardt, nr. Potsdam, and in other places the incidence of walnuts with undeveloped shells has been high (about 50%). The effect of temperature and sunlight on shell formation in walnuts is being studied.

3703. BEEFTINK, W. G.
De gevoeligheid van fruitgewassen voor overstroming met zout water. **(The susceptibility of fruit crops to flooding with salt water.)**
Meded. Dir. Tuinb., 1955, **18**: 234-49, bibl. 14, illus.

This is a Dutch version of an article which has already appeared in English [see *H.A.*, 25: 2603], but in addition there are 4 coloured plates of salt damage symptoms in apple, pear, raspberry and alder.

3704. VAN DER WERFF, H. J.
Bevloeiing van boomgaarden met zoet water ter bestrijding van verzilting. **(Irrigation of flooded orchards with fresh water.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1955, **18**: 288-96, bibl. 3, illus.

The soils of inundated orchards in North Brabant were repeatedly washed out by flooding and drainage with fresh water in an attempt to reduce the salt content. Gypsum dressings were also applied. Good results were obtained with young orchards (3–5 years old). Older orchards did not always respond favourably, but those that survived showed moderate growth. Shelter belts of alder and poplar showed quick and favourable reactions.

Viruses.

(*See also* 3689, 3807i, 3808a.)

3705. SMITH, K. M.
Recent work on plant viruses.
N.A.A.S. Quart. Rev., 1955, No. 28, pp. 153-61, bibl. 37, illus.

This review of developments in the last 7 years covers latency, relationships with insects and other arthropods, cure (chemical means of destruction, inhibitors, heat treatment), electron microscopy, development of virus-resistant plants, multiplication, and brief notes on some important virus diseases in Great Britain.

3706. BAWDEN, F. C.
Virus diseases of plants.
J. roy. Soc. Arts, 1955, **103**: 436-51.

A review of advances in the control of viruses by heat therapy, ultraviolet radiation, inhibitors of infection and insecticides.

3707. BLUNCK, H.
Fortschritte im Wissen vom Wesen und Wirken der Viruskrankheiten. **(Recent advances in our knowledge of the nature and action of virus diseases.)** [English summary 7 lines.]
Z. PflKrankh., 1955, **62**: 273-336, bibl. numerous, illus.

The subject is reviewed under the following heads: Economic importance, symptoms, transmission, physical and chemical properties of virus particles, mechanism of multiplication, nature and origin.

3708. Cropley, R.
The selection of virus-free clones of fruit plants in Britain.
Sci. Hort., 1952-54, **11**: 75-97, bibl. 66, illus.

Field inspection must be supplemented by indexing when selecting virus-free clones of fruit plants. The diseases and indexing methods are described for strawberries, raspberries, blackberries, loganberries, currants, gooseberries, stone fruits, pears, quinces and apples. Virus-tested clones of soft fruits rapidly become re-infected in commerce and should be frequently replaced by recently tested clones.—E. Malling Res. Stat.

3709. Posnette, A. F., and Cropley, R.
Leaf roll: a virus disease of cherry.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 126-7, bibl. 4, illus.

Leaf roll, a virus disease recently found in sweet cherry trees in Kent, is believed to differ from any previously described. Upward rolling of the leaves, the main feature of this disease, is accompanied by "gumming" of the trunk and main branches and by die-back. Mature trees of susceptible varieties are killed. [Authors' summary.]

3710. Klos, E. J.
Ring spot and yellows of cherry: orchard spread, injurious effects on the trees, symptom expression on different varieties, and influence of tree nutrition and light on disease development.
Diss. Abstr., 1955, **15**: 6-7, being *Publ.* 10590 of 123 pp.

Studies in a Montmorency cherry orchard showed that ring spot spread rapidly and haphazardly, and was followed by yellows in the same year or later. Cases are reported of reduced yields for 1 or 2 years after the first appearance of ring spot. On yellows trees yields were reduced in all years following the first symptom year. No differences in trunk circumference or soluble solids content of fruit were found among the ring spot, yellows or healthy groups of trees. The symptoms of sweet cherry lace leaf and ring spot of sour cherry showed a close relationship. Field experiments and leaf anatomy studies indicated that ring spot and yellows travel in phloem or phloem-related tissues. Symptoms were clearer when moderate or heavy pruning was done at the time of inoculation. On leaves of trees kept under 700 f.c. for 14 hours per day, ring spot symptoms consisted of necrotic areas. The leaf spot fungus, *Coccomyces hiemalis*, was more severe on virus-infected leaves than on healthy leaves. In nutrient experiments Mazzard seedlings showed chlorotic rings and shredding when inoculated with ring spot. Etch was found only in complete, high P, high K and low N treatments. In Montmorency trees inoculated with yellows the high K and high P treatments showed an increase in growth, mainly lateral, over other nutrient treatments. The best ring spot symptoms were shown in the minus N, complete, high K, and minus K treatments. It was difficult to correlate disease effects and nutrient treatments.

3711. Stanković, D., Pavićević, B., and Bebić, D.
Neka zapažanja o šarki šljive na kajsijama i šljivama u Timočkoj krajini. **(Some observations on the virus disease "šarka" (plum pox) on apricot and plum trees in the region of Timok.)** [English summary ½ p.]
Zasht. Bilja, 1955, No. 27, pp. 45-50, bibl. 10.

In the region of Timok (eastern Serbia) apricot as well as plum trees were found to be infected with plum pox (*Prunus* virus 7). Among plums, the indigenous varieties Požegača and Early Red were the most frequently attacked. The appearance and intensity of plum pox on plum varied greatly. More infection was noted on shaded suckers and branches than on exposed ones; sometimes there were symptoms on the suckers but not on the tree; often there were symptoms on one shaded branch while all the others appeared healthy; odd affected leaves were also noted; and healthy trees were sometimes found surrounded by diseased ones.

3712. KenKnight, G.
Chemotherapy of the peach rosette virus with antibiotics.
From abstr. in *Phytopathology*, 1955, **45**: 348-9.

The roots and lower stems of 38 inoculated Lovell peach seedlings were immersed for 4 hours in various antibiotic solutions in March. In October, 4 plants treated with achromycin and 1 each treated with agrimycin and terramycin appeared normal. Three treated with agrimycin and 2 with aureomycin showed temporary recovery. Actidione, endomycin, neomycin and streptomycin treatment did not result in recovery. Trunk injections of achromycin caused temporary recovery in 2 out of 5 cases.

3713. Cheney, P. W., and Reeves, E. L.
Viability of western X-disease virus in stored peach budwood.
Plant Dis. Reptr, 1955, **39**: 543-4, bibl. 1.

When peach budwood infected with western X-disease was stored the viability of the virus declined gradually, but it was still partially infective 19 days later when the trial ended. Further work on longer storage periods and varied storage conditions is in progress.—Agric. Res. Serv., U.S. Dep. Agric., Wenatchee, Wash.

3714. Cadman, C. H.
The implications of research on virus diseases on the present and future status of the Scottish raspberry industry.
Bull. Edinb. Coll. Agric. **47**, 1954, pp. 4-8.

The responsibility of the raspberry industry for the production of sufficient healthy stock from virus-free material provided by the research institutes is stressed. Mosaic diseases can only be eliminated with the co-operation of the growers.

3715. Reichert, I., and Ziv, S.
Death of plants in vineyards. [Hebrew.]
Hassadeh, 1955, **35**: 355-7.

A disease probably similar to "Pierce's" disease in California is reported as causing damage to vines in Israel. Symptoms are late bud burst in spring and slow growth of shoots with short internodes; the leaves are small, twisted, and show chlorotic areas. The disease, which is probably of virus origin, is believed to be spread by cicadas feeding on diseased lucerne and other crops and transmitting the virus to the vines, although further work is necessary to verify this. Great care should be taken to ensure that virus-free stocks and scions are used in grafting. H.C.R.

3716. Berry, F. H., and Gravatt, G. F.
Walnut bunch disease.
Bull. Calif. Dep. Agric., 1955, **44**: 63-7, bibl. 5, illus.

Species of *Juglans* vary in their susceptibility to this virus disease. For most species destruction of diseased trees is the only satisfactory control method. With *Juglans nigra*, however, removal of diseased branches only may lead to tree recovery.

Bacteria.

(*See also* 3616j, 3807h, 3808k.)

3717. Powell, D.
Antibiotics for the control of fireblight.
Trans. Ill. St. hort. Soc. for 1954, **88**: 156-61, bibl. 5.

Tests in Illinois in 1954 showed that 2 formulations of streptomycin (Agrimycin and Agri-strep) at 100 p.p.m. were very effective in reducing fireblight infection on apples. Neomycin was less effective. The timing of the applications in relation to the period of infection was shown to be of the utmost importance. It is recommended that 3 sprays should be given at 7-day intervals starting at the very early bloom stage.

3718. Winter, H. F., and Young, H. C.
Comparative studies on control of fireblight in apple and pear.
J. agric. Food Chem., 1955, **3**: 623-4, bibl. 3.

Fireblight of apples and pears (*Erwinia amylovora*) was successfully controlled in inoculation experiments and in field trials in commercial orchards by 3 sprays of streptomycin at 100 p.p.m. activity. Five antibiotic formulations containing streptomycin gave significant control. Terramycin and tetracycline also gave significant control, but were less efficient than streptomycin. Agrimycin, containing 10 parts of streptomycin to 1 part of terramycin, gave results equal to those of streptomycin alone. [See also *H.A.*, 25: 2627.]—Ohio agric. Exp. Stat., Wooster.

3719. Goodman, R. N.
Antibiotics for control of fireblight.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 186-90, bibl. 3.

Laboratory experiments showed that *Erwinia amylovora* development was inhibited by terramycin at 2·5 p.p.m., streptomycin at 50 p.p.m. and thiolutin at <100 p.p.m. Greenhouse experiments showed that (*a*) foliar sprays with streptomycin and Terramycin were capable of controlling fireblight in artificially inoculated 1-year-old apple trees, (*b*) the antibiotics acted systemically, and (*c*) thiolutin was ineffective. The addition of Methyl Cellosolve and Carbowax 4000 appeared to increase the effectiveness of Terramycin and streptomycin. In the field complete control of blossom and twig blight on Jonathan apples was obtained by streptomycin at 100–250 p.p.m. and Terramycin at 250 p.p.m. when spraying was started early in the bloom period and continued at 3–4 days' intervals until third cover stage. When spraying was started later (early petal fall) some blossom blight developed but shoot blight was significantly reduced. There was evidence that sprays applied during bloom only would give adequate control. Streptomycin at 100 p.p.m. caused no injury, but at 250 p.p.m. injury was severe.—Univ. Mo., Columbia.

3720. Hemphill, D. D., and Goodman, R. N.
Effects of plant-growth-regulating substances on control of *Erwinia amylovora* by streptomycin and terramycin.
Science, 1955, **122**: 122, bibl. 6.

A recent report [see *H.A.*, 24: 2441] demonstrated the value of the addition of indole-3-acetic acid to an antibiotic spray for the control of fireblight on apples. Experiments were continued to determine whether this phenomenon was peculiar to indole-3-acetic acid. The results suggest that the ethyl ester was as effective as the acid, and at a lower concentration (50 p.p.m.). Non-indigenous groups of growth-regulating substances were also tested, including α-naphthaleneacetic acid, naphthyl acetamide, β-naphthoxyacetic acid, *p*-chlorophenoxyacetic acid, 2,4,5-trichlorophenoxypropionic acid, 2,3,5-triiodobenzoic acid, α-cyano-β-2,4-dichlorophenylacrylic acid, maleic hydrazide, *p*-chlorophenyl tetradecyl ether, 2,4-dichlorophenyl tetradecyl ether, N-*m*-totyl phthalamic acid and 2,2-dichloropropionic acid. Most of these materials showed activity similar to that of indole-3-acetic acid, but the high concentrations needed and/or the phytotoxicity in some cases limits their use in practice. The most promising non-indigenous material tested was naphthyl acetamide which was effective at a lower concentration than either indole-3-acetic acid or ethyl indole-3-acetate. It is tentatively concluded from *in vitro* studies that the enhanced disease control is not the result of an effect of growth-regulating substance on the pathogen and that it therefore reflects some host plant reaction to the growth substance. The possible nature of the mechanism involved is discussed.—Univ. Mo., Columbia.

3721. Powell, D., and Reinhardt, J. F.
The effect of copper sulfate as a dormant spray for fire blight control.
Trans. Ill. St. hort. Soc. for 1954, **88**: 161-5, bibl. 3.

Fire blight infection was materially reduced in a 9-year-old Jonathan orchard in 1954 as a result of applying copper sulfate, 4 lb. to 100 gal. of water, as a dormant spray either in the spring or fall. Leaf and twig analyses, however, did not show that the copper sprays significantly increased the copper content of the tree. Soil treatments and foliage sprays of copper sulfate somewhat increased the copper level of the twigs and leaves but there was no evidence that this was directly related with fire blight infection when induced artificially by the "needle-puncture" method of inoculation. It might be postulated that the dormant sprays have a deleterious effect on the viability of the bacteria in the overwintering cankers, thus reducing the spring inoculum. [Authors' summary.]

3722. Engelbrecht, D. J.
The latest developments in the control of bacterial blight (vlamsiekte) in the Western Cape Province.
Fmg S. Afr., 1955, **30**: 213-14, 219, illus.

Certification of disease-free material was not sufficient to check the spread of bacterial blight of vines (*Erwinia vitivora*). In 2 seasons' spray trials bordeaux plus a wetting agent and captan (50% wettable powder) both reduced blight infection. Copper oxychloride and oxysulphate were as effective as bordeaux mixture in 1 season's trials.—West. Prov. Fruit Res. Stat.

3723. Nataljina, O. B., Voronkevič, I. V., and Kuznecova, A. I.
A new bacterial disease of raspberry. [Russian.]
Doklady Akad, Nauk S.S.S.R., 1954, **99**: 483-4, bibl. 3, illus.

On an irregularly irrigated plantation near Saratov raspberries were found to be infected by a new bacterial disease for which the name *Ps*[*eudomonas*] *rubi idaei* was adopted.

Fungi.

(*See also* 3415, 3500, 3513, 3531, 3790, 3791, 3807b, y, 3808d, e.)

3724. González, A. J.
Enfermedades de las plantas. **(Plant diseases.)**
Hacienda, N.Y., 1955, **50** (3): 54-63, 66, 68-9.

This popularly written article contains 2 glossaries of value to the research worker, namely the scientific names of the pathogenic fungi with Spanish and English disease names, and the Spanish disease names with scientific names of the fungi. The crops covered—albeit incompletely—are deciduous tree fruits, small fruits, nuts, vine, vegetables, flowers, turf, grasses, olive, citrus, and tropical plantation and other crops.

3725. Roosje, G. S.
Treatment of apple and pear scab in Holland.
Plant Prot. Overs. Rev., 1955, **4**: 128-35, bibl. 7, illus.

Dutch work on preventive and curative control of scab is summarized. Recent results indicate that apple scab can be very effectively treated by curative spray applications with organic mercury preparations providing they are applied within 96 hours after the beginning of a period of infection [see *H.A.*, 25: 2634]. Various difficulties, however, in particular those found in establishing the periods of infection, prevent the general use of curative spray applications.

3726. Besemer, A. F. H., and others.
Het schurftonderzoek in 1953 en 1954. Veldproeven. **(Scab research in 1953 and 1954. Field trials.)** [English summary 1¼ pp.]
Meded. Dir. Tuinb., 1955, **18**: 297-315.

In numerous field trials throughout the Netherlands the effects of preventive and eradicant sprays against scab were studied with apples and pears. Preventive sprays of organic mercury gave almost complete control of scab and were effective for up to 60 hours from infection, and 0·1% AAventa could kill an already established scab spot. On 6-year-old Jonathans, 0·1% AAventa gave good results up to 96 hours from the start of the infection period; 0·75% dinitro-benzene-thiocyanate gave fairly good control up to 26 hours from infection. A comparative trial with several organic mercury materials showed that all gave equal control for 3 days from infection, after which AAventa, Alvesco, and Hostakwik were more persistent than the others. Captan (0·5%) used as a protectant spray gave excellent results. 0·5% captan and 0·2% dinitro-benzene-thiocyanate sprayed within 24 hours of infection gave full control of apple scab. On pears 0·5% captan, sprayed after leaf infection had started, reduced the scab infection from 66·3% (control) to 6·6% of the fruits. Trees sprayed with copper oxychloride gave a reduced yield in comparison with those under lime-sulphur, organic mercury or wettable sulphur schedules, but all yields were higher than those of the controls.

3727. Simone, J.
Lutte contre la tavelure des pommiers. **(Apple scab control.)**
Reprinted from *Rev. Zool. agric. appl.*, 1955, No. 1/3, pp. 4, bibl. 3.

In Gironde in 1953/54 a number of fungicides were compared with bordeaux mixture for the control of scab on susceptible apple varieties. Recommendations are 1% bordeaux mixture for pre-blossom treatment and, for post-blossom treatment, 0·3% captan for very susceptible varieties such as Calville, and 0·3% zineb, 1% sulphur (except in very hot weather) or 0·3% ferbam (provided treatments cease 2 months before picking) for less susceptible varieties such as Canada.—Stat. Path. vég. Sud-Ouest (Inst. nat. Rech. agron.).

3728. Loewel, E. L.
Wie bewährte sich Captan im niederelbischen Obstanbaugebiet in den beiden letzten Vegetationsperioden? **(The performance of captan in the fruit growing area of the Lower Elbe during the last two seasons.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 83, pp. 69-73.

In trials involving over 100 varieties captan proved more satisfactory for apple scab control than any of the other fungicides tested. In many cases treated trees showed better fruit colour and a higher chlorophyll content of the foliage. Captan was not effective against apple mildew or pear scab. [See also *H.A.*, 24: 3608.]—Obstb. Versuchsanst. Jork.

3729. Darpoux, H.
Les tavelures du pommier et du poirier. **(Scab of apples and pears.)**
Reprinted from *Journées fruit. d'Avignon, 29 and 30 July, 1954*, pp. 107-20, bibl. 22, illus., also appearing in *Rev. Zool. agric. appl.*, 1954, No. 1-3, pp. 1-20.

The author reviews some recent work, including much of his own, on apple and pear scab control. A list of some apple and pear varieties showing their relative susceptibility to scab is given. Control methods are summarized. The author concludes that good control of scab is possible, particularly since the introduction of captan and zineb. [See also *H.A.*, 24: 2545e.]

3730. HÅRDH, J. E.
Omenarupi ja sen torjunta suomessa. **(Apple scab and its control in Finland.)** [English summary 2½ pp.]
Publs Finnish St. agric. Res. Bd **144,** 1955, pp. 43, bibl. 59, illus.

Investigations carried out at the Agricultural Research Centre, Tikkurila, during 1947-54 are reported on the biology and control of apple scab in Finland. The fungus does not appear to overwinter on apple shoots, and primary infection is from ascospores discharged from fallen leaves. Data on time of ascospore discharge are tabulated. Ground treatment with DNOC completely prevented discharge but was not a satisfactory scab control measure in the field, since spores are carried long distances by the wind and DNOC preparations are too expensive in Finland. Summer spraying according to a phenological programme with 2 applications of lime-sulphur and 2 or 3 of bordeaux satisfactorily checked the spread of scab but often caused severe spray injury. Elemental sulphur, ferbam, zineb, thiram, nirit and Phygon-XL were not generally effective. The poor fungicidal action of sulphur-containing sprays in Finland was thought to be due to the cool weather during the primary scab infection period. The best protective fungicide tested was captan; its effectiveness did not seem to be influenced by temperature, it caused no leaf injury and was half as expensive as lime-sulphur. In programmes based on time of ascospore discharge, a mixture of captan and a mercurial proved satisfactory both as a protectant and an eradicant spray. In most seasons 5–7 sprays were necessary. Application during flowering did not diminish fruit set.

3731. MIRIĆ, M.
Ispitivanje efikasnosti Duphara u suzbijanju čadave krastavosti jabuka. **(Experiments to determine the fungicidal value of Duphar for apple scab control.)** [English summary ⅓ p.]
Zasht. Bilja, 1955, No. 29, pp. 67-73.

In laboratory experiments in Jugoslavia the Dutch product Duphar [composition not stated], at a concentration of 0·15%, showed the same fungicidal value against *Venturia inaequalis* as 1% bordeaux mixture. Lower concentrations were less effective. In field tests 0·15% Duphar gave very good control of scab but was slightly inferior to 1% bordeaux owing to shorter residual effect.

3732. MULDER, D.
Het schurftonderzoek in 1953 en 1954. De invloed van de bestrijdingsmiddelen op de boom. **(Scab research in 1953 and 1954. The effect of plant protection materials on the tree.)** [English summary.]
Meded. Dir. Tuinb., 1955, **18**: 316-19, bibl. 4.

Trials were started in 1953 to examine the possible influence of various fungicide treatments for scab control on the mineral constitution of apple leaves, using 10-year-old Jonathans on M. XVI. The fungicides tested were an organic mercury preparation, 2 wettable sulphur preparations, ziram, captan and lime-sulphur. Monthly analyses of leaf samples have, so far, shown no effect on N, P K Ca Mg, Fe or Mn contents.

3733. MÜLLER, R.
Massnahmen zur Förderung der Erntemengen und Qualität durch Bekämpfung des Apfelmehltaues. **(Apple mildew control for the improvement of yields and fruit quality.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 135-41, illus.

Observations and trials showed that prevention of secondary infections is the only means of controlling apple mildew. Secondary infections may occur at any time from petal fall to the termination of shoot growth. It is necessary to spray the trees during this period, at first at intervals of 8–10 and later of 12–14 days, thoroughly wetting the foliage. A table and diagram illustrate the effect of an intensive spray programme on the following year's harvest, showing that it is economically justified. Wettable sulphur preparations gave excellent results, but Karathane (dinitro capryl phenyl crotonate) proved equally good on sulphur-shy varieties. The disadvantage of this fungicide is that it has no action on the scab fungus.

3734. NYHLÉN, Å.
Gloeosporium—lagringsskadan nr 1. Fruktlagringsnämndens undersökningar 1954-1955. **(*Gloeosporium* rot, the most important storage disorder. Studies of the Fruit Storage Committee 1954-1955.)**
Fruktodlaren, 1955, No. 3, pp. 81-3.

Losses from *Gloeosporium* rot in 5 apple varieties kept at +2° to +3° C. were again high, especially in Cox's Orange [see *H.A.*, 25: 1356]. Loss of weight during storage was negligible compared with waste caused by disease. Some data are presented on the storage behaviour of the 5 varieties.

3735. MORSCHEL, J. R. G.
Brown rot of stone fruits in New South Wales. II. Some observations and trials on the Murrumbidgee Irrigation Areas.
Agric. Gaz. N.S.W., 1955, **66**: 146-50, bibl. 2, illus.

Conditions in the M.I.A. are not normally favourable to development of brown rot (*Sclerotinia fructicola*). Tests showed that apricot flowers were most susceptible to blossom blight when quarter open to fully open; latent infection was more easily induced in fruit in the field by inoculation at the flowering stage than at petal fall. Fruit rot incidence over 5 years averaged 5·2%. The most promising materials for sterilizing large numbers of mummies appeared to be dinoc and sulphate of ammonia. In fungicidal trials over 5 seasons 2 preharvest sprays were applied to control brown rot of canning peach fruit. None of the materials applied was consistently effective in reducing the low incidence of brown rot. Dry mix lime-sulphur, applied as 2 pre-harvest sprays, is tentatively recommended for the M.I.A. [Part I by Hutton, K. E., and Leigh, D. S., *H.A.*, 25: 2644.]

3736. FOSTER, H. H.
Peach brown rot and scab control in South Carolina.
From abstr. in *Phytopathology*, 1955, **45**: 347.

Wettable sulphur at 6 lb. per 100 gal. and 50% wettable captan at 2 lb. per 100 gal. were the best of 15 different fungicides or fungicide combinations used in 2 years' orchard tests on the control of peach brown rot and scab. After 4–14 days' storage captan-sprayed peaches were freer from brown rot and *Rhizopus* lesions than sulphur-sprayed fruit. Sulphur increased sunscald and spray-burn in relatively hot weather. Captan-sprayed peaches generally had an excellent finish.

3737. GROSCLAUDE, C.
Produits nouveaux contre la cloque du pêcher. **(New products for the control of peach leaf curl.)**
Reprinted from *Rev. Zool. agric. appl.*, 1954, No. 10/12, pp. 3, illus.

Good control was obtained in experiments with 1% cuprous oxide in oil and with 0·3% dinitrophenate. Ferbam and captan gave variable results in 1954 and are being further tested.—Stat. Path. vég. Sud-Ouest (Inst. nat. Rech. agron.).

3738. SAVAGE, E. F., AND COWART, F. F.
Factors affecting peach tree longevity in Georgia.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 81-6, bibl. 8.

Field experiments were conducted to determine whether the short life of peach trees planted on old peach orchard sites was related to (1) nutrition, (2) the presence of toxic materials in the soil resulting from the decomposition of old peach roots, or (3) the toxic accumulation of insecticide materials in the soil. From the results obtained none of these factors appeared to be the cause of the short life of replants. Observations showed the presence of the fungus *Clitocybe tabescens* on the dying trees, and a survey of the principal peach growing sections of Georgia indicated widespread distribution of *Clitocybe* root rot, particularly in orchards which had been planted and replanted to peaches for many years [see also *H.A.*, 24: 2461]. None of the commonly used rootstocks appeared to be resistant to the fungus. It is concluded that the prevalence of *Clitocybe* root rot is a major cause of the heavy tree losses in replanted peach orchards in Georgia. It is not, however, regarded as a complete answer to the problem, and further studies on the physical properties of old peach orchard soils and their micro-floral content are considered desirable.—Ga Exp. Stat., Experiment.

3739. OGAWA, J. M., NICHOLS, C. W., AND ENGLISH, H.
Almond scab.
Bull. Calif. Dep. Agric., 1955, **44**: 59-62, bibl. 5, illus.

The symptoms and occurrence of almond scab (*Cladosporium* sp.) in California are reported. Observations have indicated that the most severely infected orchards are those receiving many irrigations each year.

3740. CORKE, A. T. K.
Black currant leaf spot: II. Laboratory tests of fungicides for the prevention of sporing of *Pseudopeziza ribis* on overwintered leaves.
J. hort. Sci., 1955, **30**: 197-200, bibl. 3.

Five fungicides were tested in the laboratory for the prevention of maturation of the ascospores of *Pseudopeziza ribis* on overwintered black currant leaves. Aqueous solutions of sodium dinitro-*ortho*-cresylate and sodium pentachlorophenate were effective at 0·1%. Phenyl mercury chloride was effective at 0·05% and triethyl tin hydroxide at 0·2%. Cetyl pyridinium bromide was of little value as an eradicant fungicide in this trial. [Author's summary.] [For Part I, see *H.A.*, 25: 338.]—Long Ashton Res. Stat.

3741. FULTON, R. H., AND CATION, D.
Control of strawberry leaf blight by fungicides.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 464-70, bibl. 7, illus.

The apparent increase of strawberry leaf blight, caused by *Dendrophoma obscurans*, in Michigan has resulted from large plantings of the susceptible varieties Senator Dunlap, Red Crop and Robinson. Preliminary trials showed that an eradicant spray in July with Tag 331, a 10% phenyl mercury acetate, was of value in controlling the disease. Further trials showed that a single application of Tag 331 in spring, when the plants were beginning to break dormancy, was more effective than an autumn application and not significantly less effective than autumn+spring applications. As an eradicant post-harvest spray Tag 331 proved superior to Elgetol (sodium salt of dinitro ortho cresolate). A single eradicant spray in spring with Tag 331 proved superior to a series of protective sprays during the growing season with ferbam, captan or fixed copper+hydrated lime. [For earlier work, see *H.A.*, 24: 304.]

3742. FRICK, E. L.
Laboratory tests of the effects of fungicides on the spore-germination of *Botrytis cinerea* Pers. ex Fr.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 149-51, bibl. 13.

As a preliminary step in the selection of fungicides for the control of botrytis rot on strawberries the influence of a number of toxicants on spore-germination of *B. cinerea* was tested on glass slides. The author summarizes his results as follows: "The most active were 8-hydroxyquinoline and its potassium salt, phenylmercuric chloride, a phenylmercuric 8-hydroxyquinoline complex, certain nitrosopyrazoles, captan, and thiram. The latter two would be most suitable for field application. Tecnazene and pentachloronitrobenzene, although already in use against this organism in the field, did not inhibit spore germination. Thiram and the ferric, zinc and manganese dimethyldithiocarbamates were found to cause inhibition of spore germination at two different concentration ranges, complete germination occurring at intermediate concentrations."

3743. McKEEN, W. E., AND BOSHER, J. E.
Verticillium wilt of strawberries in British Columbia.
Plant Dis. Reptr, 1955, **39**: 371-2, illus.

Wilt of strawberry, a disease of major importance in some fields in British Columbia, was found to be due to a *Verticillium* sp. Inoculation experiments showed that infection may occur over a wide range of temperatures.—Plant Path. Lab., Saanichton, B.C.

3744. AGULHON, A., AND AMPHOUX, M.
Essais de produits de lutte contre le mildiou en 1954. **(Trials of fungicides for the control of downy mildew in 1954.)**
Progr. agric. vitic., 1955, **143**: 170-9, 215-20, 267-75, 293-9 and 350-6, bibl. 9.

A detailed account is given of trials made at Beaucaire in 1954 by the Pilot Centre for Collective Control of Downy Mildew with zineb as dithane, captan as Esso 406, zineb-copper and bordeaux mixture. None of the newer fungicides was so efficacious as bordeaux against heavy attacks during periods of rapid growth. The inadequacy of Esso 406 at 0·5 and 0·25%, and the probable superiority of copper-zineb over 1·0 and 0·5% bordeaux against autumn attacks were again demonstrated.

3745. EMILIANI, G.
Quinta relazione su prove di lotta antiperonosporica con preparati cuprici ed organici. **(Fifth report on trials on the control of vine downy mildew with copper and organic compounds.)**
Bol. Staz. Pat. veg. Roma, 1954, **12**: 57-78, bibl. 13.

In 1954 the following materials were compared with 1% bordeaux for control of downy mildew on vines: (1) 4 organic, non-copper compounds, namely zineb, captan, manzate and ziram, (2) aluminium sulphate plus kaolin, (3) an organic, low-copper fungicide, namely zineb plus copper, and (4) 3 inorganic low-copper compounds, including a copper/sulphur preparation. Only a spring infection occurred. Zineb (zinc ethylene bisdithiocarbamate) gave the best leaf protection, being rated at 119 compared with bordeaux at 100. The copper/sulphur and the aluminium sulphate/kaolin products gave little protection. Captan (N-trichloromethylthiotetrahydrophthalimide) had only a short residual action. The effects of the compounds on date of leaf fall, on ripening of shoots and on the sugar content of the grape juice are discussed. [See *H.A.*, 22: 2369, 22: 3625, 24: 1360 and 25: 346.]

3746. BORZINI, G., AND MONTARULI, A.
Preparati acuprici e microcuprici nella lotta contro la peronospora della vite in Puglia. **(Non-copper and low-copper compounds in the control of vine downy mildew in Apulia.)**
Ann. Sper. agrar., 1955, **9**: 553-70, bibl. 7.
MONTARULI, A.
Prove biennali di lotta contro la peronospora della vite con prodotti acuprici e microcuprici, nel Tarantino. **(Two years' trials on the control of vine downy mildew with non-copper and low-copper compounds in the Taranto district.)**
Not. Mal. Piante, 1955, No. 31-32, pp. 181-7, bibl. 1.

SR 406 at 0·25% and zinc ethylene bisdithiocarbamate at 100–200 g. per hl. water gave as good results as the normal copper/lime mixtures in experiments on 2 varieties in 1953. Two extra applications of the non-copper compounds in October prevented early leaf-fall, the addition of a little copper sometimes being beneficial in this respect. Results in 1954 confirmed those of 1953.—Osserv, fitopat. Puglia Lucania and Ist Pat. veg. Univ. Bari.

3747. LJUBINKOVIĆ, B.
Druga dodina ogleda na suzbijanju plamenjače vinove loze. **(Second year of experimental control of *Plasmopara viticola*.)** [English summary 1¼ pp.]
Zasht. Bilja, 1955, No. 27, pp. 51-8, bibl. 1.

In experimental vineyards in Jugoslavia, where meteorological data and information on the phenological development of vine were available, spraying [with bordeaux?] before the end of the first incubation period provided effective protection against downy mildew. [For first report, see *H.A.*, 23: 2838.]

3748. BARANECKIĬ, A. V., AND PETRUHINA, M. G.
An aerosol method of application of fungicides in mildew control. [Russian.]
Vinodelie i Vinogradarstvo, 1955, No. 4, pp. 39-41, illus.

In the experiments described 20% copper naphthenate in mineral oil was applied by a lorry-mounted aerosol machine for downy mildew control on vines. The results, while better than those obtained with 1% bordeaux applied by a hand apparatus, were not very satisfactory on account of their late application.

3749. HUGLIN, P.
Remarques sur l'action des produits de lutte contre le mildiou sur la production de la vigne. **(Observations on the response of vines to fungicides for downy mildew control.)**
Vins d'Alsace, 1955, **51**: 152, from abstr. in *Mitt. Klosterneuburg, Ser. A*, 1955, **5**: 228.

The absence of downy mildew in the Colmar region in 1954 provided an opportunity of testing the widely held belief that certain fungicides have a beneficial action on vine growth and grape maturity. Neither bordeaux nor any of the organic chemicals included in the trial had any effect on yield or quality.

3750. L., H.
Les traitements contre la pourriture du raisin (botrytis). **(Treatments for control of botrytis rot of grapes.)**
Rev. romande Agric. Vitic., 1955, **11**: 54-5.

Trials were carried out over a period of 5 years at Pully to determine whether botrytis rot on grapes could be controlled by a single spray applied at the beginning of ripening. Tables show the degree of control given by 1% Organol, 0·3% Tumex solution [oxyquinoline sulphate], 0·5% captan, 0·5% copper oxychloride, 2% bordeaux mixture, and bordeaux+copper sulphate or permanganate of potash. No material gave complete control. For susceptible varieties it is recommended to spray at the onset of ripening with 1·5% bordeaux mixture, combined with 0·2% copper sulphate or 0·05% permanganate of potash, +0·07% wetter.

3751. S., M.
Lutte contre le coître de la vigne. **(Control of white rot of vines.)**
Rev. romande Agric. Vitic., 1955, **11**: 55.

Control of white rot (*Coniella diplodiella*) by dusting the surface of the soil with an organic sulphur compound to destroy the spores is generally too expensive a method. Spraying the fruit after hail damage with oxyquinoline sulphate to prevent development of the fungus in the wounds has given satisfactory results but is also expensive. Trials during the last 2 years have shown that spraying with 0·5% orthocide within 10 to 14 hours after hail will considerably reduce white rot infection, particularly if hail damage has not been too severe.

Nematodes.

(*See also* 3892, 4177.)

3752. Nyland, G.

Killing root knot nematodes in some stone fruit tree rootstocks.

Plant Dis. Reptr, 1955, **39**: 573-5, bibl. 1.

All nematodes of the species *Meloidogyne javanica* and *M. incognita* var. *acrita* in the roots of seedlings of *Prunus mahaleb* and Lovell peach were killed by immersing the plants in a water bath at 118° F. for 30 mins, 120° F. for 20 mins, 122° F. for 10 mins or 124° F. for 5 or 10 mins. Tree survival was virtually 100% for all treatments when the plants had been stored in sawdust for 6 weeks before treatment. Survival was poorer in lots treated on the day of digging or stored for 3 weeks and still poorer in lots stored for 1 week. In limited tests myrobalan seedlings behaved in a similar manner, but the survival of bitter almonds was too erratic to warrant drawing conclusions. —Univ. Calif., Davis.

3753. Oostenbrink, M.

Bodenmüdigkeit und Nematoden. **(Soil sickness and nematodes.)** [English summary ½ p.]

Z. PflKrankh., 1955, **62**: 337-46, bibl. 49, illus.

Work on nematodes as the cause of soil sickness in vegetables, nurseries and orchards is reviewed and it is shown that *Pratylenchus penetrans*, to which some ornamental and fruit plants in the nursery are susceptible, cannot be controlled by crop rotation.

3754. Meijneke, C. A. R.

Über die Bekämpfung der Bodenmüdigkeit bei Baumschulgewächsen mit Nematiziden. **(On the control of soil sickness in the nursery by nematocides.)**

Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 83, pp. 115-21, illus.

The injection of chloropicrin and DD into "sick" soil in a fruit tree nursery markedly reduced the number of eelworms (*Pratylenchus* sp.) infesting the roots and correspondingly improved plant growth during the first two years after treatment. The residual action of DD—much the cheaper of the two chemicals—seems to continue even for 3 years. In view of its phytotoxicity DD should be applied as long as possible before sowing or planting, the dosage recommended being 60 cm^3/m^2. EDB (ethylenedibromide) proved unsatisfactory, while applications of the fungicide nabam failed to produce any effect. Results obtained in pot trials with *Prunus mahaleb* seedlings grown in old cherry soil suggest that soil sickness in the field is, at least partly, due to nematode infestation, and that soil fumigation with DD around each planting hole prior to replanting would overcome the check to growth.—Plantenziektenkundige Dienst, Wageningen.

3755. Braun, A. J.

Evidence of damage to strawberry by ectoparasitic nematodes.

From abstr. in *Phytopathology*, 1955, **45**: 183.

Root lesions resembling feeding scars of ectoparasitic nematodes have been found to be associated with root rot and decline in many commercial plantings of strawberry in New York State. Various species of nematode are abundant in the soil of the root zone of plants showing moderate to severe root damage. Nematodes are considerably less numerous or absent in areas where the symptoms are not found. In plots fumigated with Dowfume W-85 (1,2-dibromoethane) at rates of 4·5 and 9·0 gal./acre prior to planting, runner plant production was increased 4·8 and 27·3% respectively, and yields were increased 24·0 and 36·9%.

Mites.

(*See also* 3500, 3765, 3808h.)

3756. Chant, D. A., and Muir, R. C.

A comparison of the imprint and brushing machine methods for estimating the numbers of fruit tree red spider mite, *Metatetranychus ulmi* (Koch), on apple leaves.

A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 141-5, bibl. 4, illus.

An experiment to test the relative efficiency of the imprint and brushing machine methods for estimating the numbers of fruit tree red spider mites on apple leaves is described. The numbers *not* recorded by the imprint method were significantly greater than those *not* recorded by the brushing machine method, and it would thus appear that the latter is the more efficient of the two. The data suggest that there is, however, no room for reduction in sample size, but probably the reverse. [Authors' summary.]—The brushing machine, which is described and illustrated, was constructed from a prototype developed by the Division of Entomology, Canada Department of Agriculture.

3757. Morgan, C. V. G., and others.

Methods for estimating orchard mite populations, especially with the mite brushing machine.

Canad. Ent., 1955, **87**: 189-200, bibl. 10, illus.

The following methods are described and their relative efficiency compared: counting or estimating the number of mites on the leaf with the aid of a lens or microscope, the paper impression method, the removal of mites with solutions and subsequent aliquoting, the beating of mites from twigs and foliage, and the brushing of mites from leaves and subsequent counting of a fraction of them. [See previous abstract.]—Ent. Div., Sci. Serv., Dep. Agric., Ottawa.

3758. Freeman, G. H., and Hall, M. J.

Some statistical aspects of a recent series of fruit tree red spider mite control trials.

A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 102-6, bibl. 6.

This paper describes an investigation into the statistical features of a series of fruit tree red spider mite control trials, with the following results. The transformation of counts of red spider eggs and mites to log $(n+\frac{3}{8})$, which has been used throughout the trials for statistical analysis, is shown to be justified. The sources of variation have been considered, and it is found that, although the most important source is that from leaf to leaf, both the variation between trees and that between plots should also be taken into account. The causes of variation have also been examined; of these it appears that spraying is the major one, but that there is a tendency, particularly with eggs, for the variation after spraying to be negatively correlated both with the mean population level and with time. For mites there is another factor to be considered, which may well be the effect of predators. The results from trials in two different orchards tend to confirm one another and may thus be of wide application in trials of this nature. [Authors' summary.]

3759. Cranham, J. E., and Marshall, J. G. S.
Pink bud spray for control of red spider.
Grower, 1955, **43**: 1253-5.

Recommendations are made for the application of chlorbenside as parachlorphenyl benzene sulphonate or parachlorphenyl parachlorbenzene sulphonate at pink bud, and again in June or July, for the control of red spider on apples. The value of these sprays lies in their persistence, though fairly high percentages of winter eggs are also killed. Application to pears should be made at white bud, and to plums at cot split. Limited trials have shown that even ½ lb. chlorbenside wettable powder/100 gal. water can be very effective.—Boots Pure Drug Co. Ltd.

3760. Driggers, B. F.
Ovotran wettable containing Ovex for early season control of European red mite on apples.
Down to Earth, 1955, **11** (1): 17.

In experiments in 1954 ovotran wettable powder at the rate of 4 oz. in 100 gal. water gave almost complete control of *Paratetranychus ulmi* nymphs when used at pink bud after application of oil at green bud, or at pink bud and petal fall without earlier mite treatment. Very slight injury followed the pink bud spray on some trees. As a summer spray ½ lb. ovotran per 100 gal. gave good control.—N.J. Agric. Exp. Stat., New Brunswick.

3761. Philips-Roxane, N. V.
Tedion V 18 Duphar, un nouvel acaricide selectif. **(Tedion V 18 Duphar, a new selective acaricide.)**
Fruit belge, 1955, **23** (suppl. to No. 166): 10-12.

Tedion V 18 Duphar is a mixture of several diphenylsulphones, of which 2,4,5,4-tetrachlorodiphenylsulphone is the most active. In the laboratory Tedion was tested with PCPBS, PCPCBS and chloroparacide for the control of *Tetranychus urticae* on beans. Tedion was strongly ovicidal and gave 100% mortality at as little as 10 p.p.m. It was effective at lower temperatures than the other materials tested. In field trials the same materials and parathion were applied to apples at the beginning of June; 3 counts were made at monthly intervals. A 0·05% Tedion spray showed a remarkably persistent effect, and 3 months after application only 6 adult mites were counted on 50 leaves. Seedlings of *Tropaeolum majus*, cucumbers, tomatoes, beans and peas were used in phytotoxicity tests, but no injury was shown 10 days after spraying with Tedion at concentrations of 0·3%, 1% and 3%. In field tests with apples, sprays of 0·1%, 0·15%, 0·2% and 0·25% Tedion applied at the beginning of July did not cause leaf injury. There was little indication of toxicity to insects or warm-blooded animals.

3762. (Gentner, L. G.)
Organic phosphates and mite resistance.
From abstr. in *Agric. Chemls*, 1955, **10** (7): 70.

In tests on pears at the Southern Oregon Experiment Station, Medford, none of the organic phosphate materials used, including 3 systemics, gave commercial control of mites, while all of the non-phosphate materials used gave control. It is concluded that the two-spotted mite is resistant to organic phosphate sprays.

3763. Allen, W. W.
Cyclamen mite investigations.
Calif. Agric., 1955, **9** (6): 7, 11, illus.

In tests with more than 50 chemicals against the cyclamen mite, *Tarsonemus pallidus*, on strawberries the most effective were endrin, azobenzene and isodrin applied at rates of 800 gal. per acre. The long residual action of these compounds should make it possible to use them to control the mite on ornamentals with a limited number of sprayings, but with strawberries the high gallonage needed and the toxic residues left provide problems as yet unsolved.—Univ. Calif., Berkeley.

3764. Mathys, G.
La lutte contre l'araignée rouge de la vigne. **(Red spider control in vines.)**
Rev. romande Agric. Vitic., 1955, **11**: 38-40, bibl. 2, illus.

Further observations confirmed the conclusions of an earlier paper (*H.A.*, 25: 359) that, where possible, measures for the control of *Metatetranychus ulmi* on vines should aim at the preservation of the predator *Typhlodromus tiliae*.

Insect pests.

(*See also* 3807c, e, j, k, o, p, s, 3808c, f, g.)

3765. Smith, L. M., and Stafford, E. M.
Grape pests of California.
Circ. Calif. agric. Ext. Serv. **445,** 1955, pp. 61, illus.

Over 40 insect and mite pests are described briefly as regards appearance, life history, injury caused and control. A seasonal injury chart is provided to help to identify pests by the damage they do and to provide references to pages on which appropriate control measures are described.

3766. Chandler, S.
Peach catfacing studies of 1954 and other experimental work of the year.
Trans. Ill. St. hort. Soc. for 1954, **88**: 146-55.

Peach catfacing. Orchard tests showed that treatment for control of catfacing must be started early, in the full pink or early bloom stage. Dieldrin dust gave better control than parathion. Catfacing was mainly caused by stink bugs [*Euschistus* spp.]. *Plum curculio on apples.* Dieldrin, $\frac{1}{4}$ lb. actual per 100 gal., gave very much better control than chlordane at 1 lb. actual per 100 gal. *Roundheaded apple tree borer.* Spraying the trunks of the trees only with DDT+sticker, at 2- to 3-week intervals during the time of emergence and oviposition of the beetles, resulted in only about 50% control. Spraying the entire trees, however, to kill the adults, with 6 lb. lead arsenate, 4 lb. DDT 50% w.p. and 3 lb. ferbam 76% w.p. per 100 gal. reduced infestation from 60·3% in the controls to 2·2%. It is necessary to give 4 applications at 2-week intervals beginning about 3 weeks after the calyx period. *Two-spotted mites.* Ground spraying with Ovotran at 1 lb. per 100 gal. in July was ineffective in preventing the migration of two-spotted mites from the ground cover in a sod apple orchard to the trees in midseason.

3767. JOUBERT, C. J., AND WALTERS, S. S.
A preliminary report on the control of the Argentine ant (*Iridomyrmex humilis*) by applying insecticides to the soil.
Fmg S. Afr., 1955, **30**: 269-72.

Aldrin, dieldrin and chlordane were applied to a mealybug-infested vineyard for the control of Argentine ant. Few ants were found in treated plots, and in laboratory tests soil from these plots killed ants almost 2 years after treatment. Grapes harvested from treated plots were free from mealybug. Recommendations for practical application of these results are given.—Stellenbosch-Elsenburg Coll. Agric.

3768. CABRAL, M. C. DE M.
Quelques essais de lutte contre le *Pseudococcus citri* de la vigne. **(Some experiments on the control of the vine mealybug.)**
Bull. Off. int. Vin, 1955, **28** (291): 73-6.

Recommendations made in the light of tests in 1948/52 are: (1) for heavily infested vines—barking and dormant spraying with tar oil followed by spring control of the Argentine ant with chlordane; (2) for lightly infested vines—ant control only. Control of the ants should be undertaken as soon as they appear.—Posto vitivinicola de Dois Portos.

3769. FRANGOPOULOS, A. M.
The treatment of mealy bugs on vines in Egypt.
Plant Prot. Overs. Rev., 1955, **4**: 143-4.

Recommendations for the control of *Pseudococcus citri* on vines in Egypt are: (1) During winter, soon after pruning, scrape off the loose bark from the crown to the branching of the vine to expose the hibernating insects. Collect and burn all scrapings and prunings. (2) Spray with a good winter wash at 5–7%. (3) If the attack is very heavy and the insect is established on the crown, apply 20 g. of Paradex (paradichlorbenzene) to each plant just before the spring irrigations. (4) During the summer, when the young nymphs start crawling towards the aerial part of the plant (in Egypt, April and May), spray twice with 1: 2,000 Fosferno 25. (5) Avoid the use of DDT during the year of treatment. The effect of such treatment should persist for several years. —Soc. vitic. vinic. Egypte.

3770. BERAN, F.
Zur Kenntnis der Wirkung von Cyanwasserstoff gegen San José-Schildlaus (*Quadraspidiotus perniciosus* Comst.). **(On the action of hydrocyanic acid against San José scale.)** [English summary $\frac{1}{2}$ p.]
PflSch. Ber. Wien, 1955, **14**: 145-53, bibl. 9.

Sections of apple shoots infested with San José scale were fumigated with HCN for 10 min. and longer periods. The results show that maximum control is achieved if the treatment is not limited to 10 min., a 100% kill, for instance, being obtained from 45 min. exposure to an HCN concentration of 1·9 g./m^3. Evacuation of the material immediately after fumigation reduced the effect of the treatment, as the residual HCN was found to remain active for some time.

3771. EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANISATION.
***Aspidiotus perniciosus* Comst., San José scale: Europe—1954.** [English and French.]
[*Mimeo. Publ.*] *Eur. Med. Plant Prot. Org.* [*EPPO*], Paris, 1955, pp. 8+9.
Report of the working party on San José scale (Lyons, March 29-30, 1955). [English and French.]
[*Publ.*] *Eur. Med. Plant Prot. Org.* [*EPPO*], Paris, 1955, pp. 19, bibl. 29, illus.

The first paper briefly reports the situation in the various European countries in 1954 concerning spread of the pest, phytosanitary regulations and new developments in control measures.

The second paper deals with the following aspects of the subject: (1) *Phytosanitary regulations.* Recommendations are made concerning the host plants to be fumigated on importation. (2) *Control.* Methods are reviewed of insecticidal treatment and fumigation. (3) *Biology.* Parthenogenesis, natural mortality, predators and parasites, resistance and spread are discussed. (4) *Research and experiment.* Possible biological control with *Prospaltella perniciosi*, prospects of infestation in northern Europe, effect of HCN, and control by frost-spraying with oil. Austrian experiments have shown that if oil sprays are applied at a temperature below freezing point it is possible to control San José scale completely with concentrations which are normally ineffective. This is due to the fact that with frost-spraying run-off is avoided, as the sprayed liquid freezes immediately and fixes the oil on the plant and insect surfaces. By this means it is possible to reduce oil concentrations by one half. A similar result can be obtained by atomizing, which saves about one-third of the spray material. Experiments with yellow oil emulsions and DNBP have shown that their efficiency cannot be affected by rain falling later than one hour after application.

3772. HUTCHINSON, M. T.
Systox for control of the leafhopper vector of cranberry false-blossom.
J. econ. Ent., 1955, **48**: 222-3, bibl. 2.

Systox applied to the soil at a concentration of $1\frac{1}{2}$ to 2 pints of 23% emulsion concentrate per 100 gal. rendered cranberry plants toxic to the blunt-nosed cranberry leafhopper, *Scleroracus vaccinii*, for more than 4 months.—N.J. agric. Exp. Stat.

3773. Barnes, M. M., and Ash, C. R.
Ovicidal action of malathion on grape leafhopper eggs.
J. econ. Ent., 1955, **48**: 220-1, bibl. 2.

In the laboratory experiments described 4% malathion dust applications gave good control of grape leafhopper, *Erythroneura variabilis*, eggs.

3774. Hinrichs, H. A., and Thomson, H. J.
Insecticide tests for pecan weevil control.
Bull. Okla agric. Exp. Stat. **B-450,** 1955, pp. 12, illus.

One or two sprays of 50% DDT wettable powder at the rate of 4 lb. per 100 gal. water are recommended for pecan weevil (*Curculio caryae*) control in Oklahoma. The first application should be made about 10 August and the second, if infestation is severe, after the first subsequent heavy rain or by 1 September.

3775. Moreton, B. D.
Control for ground beetles on strawberries.
Grower, 1955, **43**: 1433.

Damage to strawberries in Kent by ground beetles is caused chiefly by the seed-eating ground beetle (*Pseudophonus pubescens*), and also by flesh-eating ground beetles (*Pterostichus* spp.). Poison bait containing 1% BHC was sprinkled in and near the crowns during fruiting, but results were disappointing, 40% kill being the best obtained. Where straw is not used bait may be more effective. Dusting with 1·5% aldrin at the rate of 1½–2 cwt. per acre between the rows before strawing is suggested as a possible control method.—N.A.A.S., Wye, Kent.

3776. Eide, P. M.
Soil treatments for *Brachyrhinus* control in strawberries.
J. econ. Ent., 1955, **48**: 207-8, bibl. 1.

Plots treated with various insecticides prior to planting strawberries in 1950 and 1952 were artificially infested with eggs of 2 species of *Brachyrhinus* weevil in the autumn of 1953. When the effectiveness of the materials applied in 1950 was evaluated in 1954 it was found that aldrin and dieldrin at 5 and 7·5 lb. and chlordane at 15 lb. per acre gave very good control of *B. ovatus*. For the control of *B. sulcatus* 7·5 lb. per acre of either aldrin or dieldrin was required. Of the treatments applied in 1952, aldrin, dieldrin and heptachlor at 3·5 and 5 lb. per acre were found effective against *B. sulcatus*. None of the soil applications affected the flavour of the strawberries.

3777. Naef, J.
Dickmaulrüssler-Schäden in der Bündner Herrschaft. **(Injuries [to vines] by *Otiorrhynchus* sp. in the Bündner Herrschaft, Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 311-13, illus.

In certain areas of the Bündner Herrschaft, Switzerland, larvae of *Otiorrhynchus* sp. have caused serious injuries to the foliage and roots of vines. The symptoms, which resemble those of phylloxera infestation, and the beetle are described and illustrated. A single, thorough application of 0·3% Gesarol 50 failed to control the pest.

3778. de Jong, D. J.
Waarnemingen over de levenswijze en de bestrijding van de zuringbladwesp, *Ametastegia glabrata* Fallen (Hymenoptera, Tenthredinidae). **(Observations on the biology and control of the dock sawfly.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 325-41, bibl. 12, illus.

In the Netherlands serious damage has occurred locally during the past 5 years from autumnal attacks by the larvae of dock sawfly on apples and sometimes pears. Late apple varieties were the most likely to be attacked; bush forms were preferred to standards. Egg parasitism by *Trichogamma* was observed but was of little importance. Some control was obtained by cutting down the polygonaceous food plants of the sawfly. Parathion and BHC gave good control in laboratory tests; parathion and DDT were used successfully in the field when applied during the first half of September.—I.P.O., Wageningen.

3779. Barlow, H. W. B., Dicker, G. H. L., and Briggs, J. B.
Studies on control of apple sawfly, *Hoplocampa testudinea* (Klug). II. Effect of sprays on fruit drop and yield.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 107-14, bibl. 6.

Reference is made to earlier trials carried out over 3 years with sprays of parathion, γ-BHC and nicotine against apple sawfly on two varieties of apple [*H.A.*, 23: 2890], and details are given of a further trial carried out in 1953. Of the 3 sprays only parathion had a marked effect on fruit drop, which was not associated with its control of sawfly. A hypothesis is advanced to account for the different effects of early and late applications of parathion on fruit drop. The only treatments resulting in increases in final yield were some of the parathion applications in each year and BHC in 1953. The addition of NAA to parathion in 1950 resulted in reduced yields.

3780. Pickett, A. D., and Patterson, N. A.
Observations on spray programs in 1953.
90th A.R. N. Scotia Fruit Grs' Ass. 1953, pp. 31-5.

Observations recorded indicate that the codling moth is the insect causing the greatest damage to apple in Nova Scotia. DDT provides the most effective control but increases the prevalence of other pests, necessitating the application of additional pesticides. Ryania shows promise of reducing codling moth populations without interfering seriously with natural controls. Other things being equal, low residue sprays are conducive to better natural control of the codling moth and the eye-spotted bud moth. Proximity to roads, particularly dusty roads, tends to increase damage from both these pests. [From authors' conclusions.]

3781. Hamilton, D. W.
Codling moth control.
Agric. Chemls, 1955, **10** (7): 41-2, 111, bibl. 5.

With chlorinated hydrocarbon, organic phosphorus, systemic and botanical insecticides.—Agric. Res. Serv. U.S.D.A., Fruit Insects Sect., Vincennes, Indiana.

3782. Bjegović, P.
Avio-zamagljivanje gusenica gubara u Metohiji 1954 godine. (**Mist spraying by aircraft of the gypsy moth caterpillars in the region of Metohija in 1954.** [English summary ½ p.]
Zasht. Bilja, 1955, No. 27, pp. 65-77, bibl. 2.

In oak thickets 33% DDT applied from aircraft at the rate of 2 kg. per ha. gave very good control of gypsy moth [*Lymantria dispar*] caterpillars, and thereby prevented the infestation of neighbouring orchards.

3783. Thiem, E., and Wiegand, H.
Beobachtungen und Vorschläge zur Bekämpfung des Goldafters [*Euproctis chrysorrhoea* L.]. (**Observations and suggestions on the control of *Euproctis chrysorrhoea*.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 124-8, bibl. 8.

The application of emulsified DDT or BHC preparations is recommended for *Euproctis chrysorrhoea* control in orchards. The biology of the pest and the timing of the treatment are discussed. [See also *H.A.*, 24: 3647.]

3784. B., M.
La lutte contre les larves de la deuxième génération de *Simaethis pariana*. (**Control of second generation larvae of *Simaethis pariana*.**)
Rev. romande Agric. Vitic., 1955, **11**: 55, illus.

First generation larvae of *Simaethis pariana*, a lepidopterous insect, have caused serious damage to apples in French Switzerland. They eat the upper surface and parenchyma of the leaves, the damaged portions of which turn a reddish colour. The larvae make silky cocoons on the surface of the leaves from which second generation larvae emerge in August-September. The second generation may cause even more serious damage than the first. Control measures commonly employed against codling moth are also effective against *Simaethis*, but care must be taken to wet the upper surface of the leaves thoroughly, as damaged leaves often curl.

Birds.

(*See also* 3807q.)

3785. (Clarke, W.)
Electric rattles have saved cherries.
Comm. Gr, 1955, No. 3109, p. 203, illus.

An electrically operated wooden rattle, mounted high on a pole, has given almost complete protection from birds to ½ acre of cherry orchard in Norfolk. A variable noise is essential, and short sharp bursts are most effective.

Rodents.

3786. Thiele, H.-J.
Beiträge zur Anwendung cumarinhaltiger Präparate in der Nagetierbekämpfung. (**On the use of preparations containing coumarin for the control of rodents.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 61-7, 93-9, bibl. 20.

Feeding experiments with rats and mice indicate that preparations containing 4-oxycoumarin are better than warfarin only against rats. Methods of application, dosages and toxicity to domestic animals are also discussed.—Biol. Zentralanst. Berlin-Kleinmachnow.

Fungicides and insecticides.

(*See also* 3807r, t, v, w, 3808i, j.)

3787. McCallan, S. E. A., Miller, L. P., and Magill, M. A.
Chemical names for active ingredients of fungicides.
Phytopathology, 1955, **45**: 295-302.

An alphabetical list is presented of over 260 fungicides including seed disinfectants, soil fumigants, chemotherapeutants and agricultural bactericides, giving the chemical names of their active ingredients.

3788. (Roberts, D. A.)
Results of 1954 fungicide tests.
Agric. Chemls, 1955, **10** (4): 47-51, (5): 39-42, 113, and (6): 53, 55, 57, 59, 125, 127. [Reprints available at $1 through the author, Coll. of Agric., Ithaca, N.Y.]

This is an annual summary of reports on fungicide tests by 75 pathologists who sent accounts of their work to a committee of the American Phytopathological Society. The information presented in 45 tables relates to materials tested for disease control in fruit and nut crops, turf plants, field crops including tobacco, ornamentals and vegetables. Lists are also given of the materials and their chemical names that were applied to each group of crop plants.

3789. Fontana, P., and Zampighi, G.
Fungicidal activity, persistence and migration of zinc ethylenebisdithiocarbamate on vines.
Ann. Chim., Roma, 1954, **44**: 988-96, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-10.

The fungicidal film is stable to atmospheric chemical action but is easily washed off in heavy rain. In a dry period loss in 10 days was only 3·5%, but in heavy rain it was 86%. There was found to be 0·015–0·26 mg./g. of the material (or a material reacting similarly on analysis) in young sprayed leaves, the amount depending on the time of year. At the concentration used the activity of zinc ethylenebisdithiocarbamate was comparable with that of Cu salts and was not enhanced or reduced by the presence of Cu salts.

3790. Palmiter, D. H., and Smock, R. M.
Effect of fungicides on McIntosh apple yield and quality: a five-year study under Hudson Valley conditions, 1949-1953.
Bull. N.Y. agric. Exp. Stat. **767**, 1954, pp. 40, bibl. 7.

Eight fungicide treatments were applied to McIntosh apple trees over a period of five years (1949-1953) to determine the effects on yield and quality. The treatments included (1) Micronized wettable sulphur, (2) Micronized plus lime, (3) Everett flotation sulphur paste, (4) Everett flotation in the pre-cover sprays followed by Fermate in the cover applications, (5) Crag Fruit Fungicide 341, (6) Fermate, (7) Phygon XL in the pre-cover applications followed by Fermate in the cover sprays, and (8) Tag Fungicide 331 in pre-cover sprays followed by Fermate in the cover applications. Arsenate of lead was the main insecticide used in combination with the fungicides. All treatments provided adequate control of apple scab during the 5-year period. Fermate proved the safest of the test fungicides for all-season use on McIntosh. This was indicated by the appearance of the trees, the chlorophyll content of the leaves, tree growth and set of fruit. After the first three years of adjustment, the yield of picked fruit from the trees sprayed with Fermate increased in 1952 and 1953 while that following the other treatments decreased. The Fermate produced the greatest amount of U.S. No. 1 fruit (512 boxes per acre) as a result of consistent yields of fruit of good size and colour. Trees sprayed with flotation sulphur in the pre-cover period and Fermate in the cover applications ranked next to the all-season Fermate programme in yield of U.S. No. 1 fruit, whereas the all-season flotation sulphur treatments resulted in the lowest yield of U.S. No. 1 fruit (343 boxes per acre). The use of sulphur during the summer period resulted in reduced chlorophyll content of leaves, poor fruit size and colour, considerable sulphur-sun scald fruit injury in 1952, and reduced fruit set in 1953. The addition of lime to Micronized wettable sulphur improved scab control and fruit size and colour. Part of the problem with wettable sulphur fungicides would appear to be their incompatibility with arsenate of lead, especially if lime is not used. The fungicide treatments affected the maturity date of McIntosh apples. Fruit from the various treatments ripened in the following order: Crag 341, Micronized, Phygon/Fermate, Fermate, and Tag/Fermate. The time interval varied from 0 to 13 days depending on the season. While the cost per acre for the organic fungicides was greater than for the sulphur materials, the use of Fermate alone or in combinations with sulphur increased the production of U.S. No. 1 fruit sufficiently to justify the additional cost. [From authors' summary.] [See also next abstract.]

3791. PALMITER, D. H., AND HAMILTON, J. M.
Influence of certain nitrogen and fungicide applications on yield and quality of apples.
Bull. N.Y. agric. Exp. Stat. **766**, 1954, pp. 41, bibl. 17.

Results of long-term experimentation are presented on the effect of various soil and foliage applications of nitrogenous materials, particularly urea (Uramon or NuGreen), in combination with a wettable sulphur, on apple yields, fruit quality, orchard vigour, and apple scab control. Fermate (ferbam) was included as one of the foliage spray treatments. The data over a 9-year period indicate that the inclusion of urea 5–100 in the first three pesticide sprays following bloom maintained apple trees at a satisfactory level of N nutrition. It is possible to influence the set, size and colour of fruit by altering the number of urea foliar applications and the time of the spray with respect to the stage of tree development. Fruit drop increased as the N level rose with both foliage and soil applications of N. Fruit colour decreased more with soil application than with foliage applications. The addition of soluble complete fertilizer, of mixtures of minor elements, and of physical adjuvants to the urea spray mixture appears to be of questionable value for the average orchard. Urea was found to be compatible with standard pesticides and may be used on standard varieties in western New York. Tests indicated that injury may occur at concentrations above 24 lb. to 100 gal. of spray. Trees receiving foliage applications of urea showed a lower incidence of apple-scab infection than those with soil treatment of N but with the same sulphur spray programme. Trees sprayed with Fermate without additional N outyielded those sprayed with wettable sulphur with or without supplemental N. Continuous use of sulphur and arsenate of lead without lime lowered the pH of the soil to an undesirable level. Fermate-sprayed trees maintained their yield without the N level being increased and thus were more resistant to scab infection. Fruit from trees sprayed with Fermate dropped less at harvest, had better colour, and was firmer and larger than that from trees sprayed with sulphur and treated with N to maintain yield. [Authors' abstract.]

3792. FUSCO, F., TRAVE, R., AND VERCELLONE, A.
Iridomyrmecin, a natural insecticide from *Iridomyrmex humilis*, Mayr.
Chim. e Industr., 1955, **37**: 251-8, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-9.

Studies on iridomyrmecin, a new insecticide extracted from the common Argentine ant, are reported. The compound, $C_{10}H_{16}O_2$, is an optically active lactone of a cycloparaffin, yielding a dicarboxylic acid on oxidation.

3793. CHAMBERLAIN, R., AND WILLIS, R. J.
Observations on the use of benzene hexachloride for the control of certain pests of apple in Northern Ireland.
Res. exp. Rec. Minist. Agric. N. Ireland 1952/53, (issued 1955), **3**: 69-81, bibl. 7.

Field experiments have demonstrated that applications of a suitable formulation of benzene hexachloride (BHC) can be introduced into the apple spraying programme in Northern Ireland to provide an effective means of dealing with some of the more common orchard pests. A spray containing 0·2% BHC applied at the bud-burst and green-cluster stages will control apple aphids, woolly aphid and apple capsid, and a spray containing 0·1% BHC applied at the petal-fall stage will control apple sawfly. The results showed that such control treatment can be adopted on a commercial scale with an appreciable saving in cost as compared with alternative measures formerly employed. The wettable powder formulation of BHC is compatible with the mercury-based fungicides in general use for apple scab control; it can also be incorporated with bordeaux mixture provided the combined spray is applied within a short time after preparation. [From authors' summary.]

Spray application and effects.

(*See also* 3430, 3431, 3807d, g, n, u, x.)

3794. FOULDS, R. M., HEY, G. L., AND DUNNAM, D.
Low volume sprays for pest and disease control.
Grower, 1955, **43**: 941-5.
HEY, G. L.
Captan: the new organic fungicide.
Grower, 1955, **43**: 1005-7.

Hey, G. L.
Planning a full captan spray programme.
Grower, 1955, **43**: 1077-9.
Hey, G. L., and Marshall, K.
New methods of pest control on soft fruits.
Grower, 1955, **43**: 1093-7.

Problems of pest and disease control are discussed. American and English work with captan is summarized. Four alternative low volume spray programmes, which use 50 gal. per acre and can be applied to most crops, are presented. Practical advice is given on the application of captan for control of scab on apples and pears [see also *H.A.*, 25: 2637], strawberry botrytis, black currant leaf spot and black spot of roses. Information is presented on new materials for pest and disease control in strawberries, black currants, raspberries, loganberries, blackberries and gooseberries.—Murphy Chem. Co.

3795. Maceljski, M.
Iskustva pri radu sa ručnim zamagljivačima Swingfog. (**Tests on the Swingfog apparatus.**) [French summary 1 p.]
Zasht. Bilja, 1955, No. 28, pp. 81-92, illus.

An account is given of successful tests on the Swingfog apparatus [a type of hand gun] for the control of *Hyponomeuta* sp. and *Hyphantria cunea* in Jugoslavia. An aerosol containing 16·5% DDT was used at the rate of 75–120 cc. per tree.—Zagreb Plant Prot. Stat.

3796. Bray, D. F.
Development of a sticker for use with pesticides applied as sprays.
(*Tech.*) *Bull. Del. agric. Exp. Stat.* **304**, 1954, pp. 22, bibl. 8.

A compound with adhesive properties—"National Sticker"—has been developed which improves the deposits of pesticides applied as sprays and reduces the usual losses in residues from weathering. It is made up of adhesive substances synthesized from sugar dissolved in a solvent. It is compatible with insecticides and fungicides commonly recommended for vegetables and fruits, and also with certain herbicides and nutrient materials. As a spray adjunct it has been evaluated on beans, broccoli, cabbage, corn, cucumber, potato, tomato, apple and peach, with significant gains in pest control and/or the quality and size of the harvested crop. In certain cases inclusion of this sticker has made possible a substantial decrease in the number of applications required for effective results. [From author's summary.]

3797. Brittain, R. W., Brazee, R. D., and Carleton, W. M.
Evaluating dusting and spraying efficiency.
Agric. Engng St. Joseph, Mich., 1955, **36**: 319-20, 323, bibl. 3, illus.

A description is given of a rapid, simple and inexpensive titrimetric technique for evaluating copper deposits on plant surfaces. It has shown promise in tests on beans but has the limitation that it gives no information on uniformity of cover.

3798. Harin, S. A.
Factors affecting the process of dusting plants. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1955, **20** (3): 24-9, bibl. 12.

A discussion on the physical properties of dusts, weather conditions, apparatus and plant characteristics as affecting the deposition, adherence and retention of plant protective materials.

3799. Pickett, A. D.
Modified spray programs for fruit pest control.
Agric. Chemls, 1955, **10** (6): 36-7, bibl. 1.

The high cost of full spray programmes, the danger they constitute to beneficial insects and the ways of overcoming these problems by reduced spraying with selective insecticides are discussed. In many Nova Scotia apple orchards only 2 insecticidal applications are now made per year, and the materials used are largely confined to nicotine, lead arsenate and ryania.

3800. Ostrovskiĭ, N.
The problem of preservation of beneficial insects during the application of poisonous chemicals. [Russian.]
Zemledelie, 1955, **3** (1): 110-12.

A general discussion on the danger of chemicals to beneficial insects and in particular to pollinators, and on means of overcoming these dangers. Of methods of insecticidal application, placement of poison baits is the safest, spraying less so and dusting is the most dangerous. Systemic insecticides are, on the whole, harmless, though occasionally systemics such as octamethyl[pyrophosphoramide] can poison the nectar of the treated plants, thus becoming dangerous to bees.

3801. Australia Department of Health (Pengelly, J.).
Pesticide Quarterly Supplement.
Commonw. Aust. Dep. Health, 1955, No. 9, pp. 433-54, bibl. 12.

The current number of this review is concerned with (1) the Zuckerman report in Great Britain on toxic chemicals in agriculture [see next abstract], (2) U.S.A. legislation on pesticides including tolerances for insecticides and fungicides, (3) fertilizer-pesticide combinations, (4) pesticide hazards from aerial dusting and spraying, (5) precautions in the use of pesticides.

3802. Zuckerman, S., and others.
Toxic chemicals in agriculture. Risks to wild life. Report of the working party.
Publ. Minist. Agric. Lond., H.M. Stationery Office, 1955, pp. 31, 1s. 6d.

A report is made on the danger to wild fauna (mammals, birds, insects and fish), to domesticated fauna (mammals and honey bees) and to flora from the use of toxic chemicals as insecticides, fungicides and herbicides. In addition to information obtained from numerous organizations and individuals, small-scale trials were carried out to determine the value of such research. The following are among the conclusions reached: The total number of casualties to wild birds and mammals caused by spraying during an average season in Britain is not at present high. The sprays most likely to be harmful, in order of danger, are organo-phosphorus insecticides applied to brassicas in late summer; arsenical compounds used for potato haulm destruction; dinitro weedkillers applied to corn and peas in spring and July; and DDT insecticides applied to orchards, carrots and peas. The danger to insects is much greater than to birds and mammals but is even more difficult to evaluate; the importance of research into the effects of plant protective chemicals on the balance of insect populations is stressed. There has been some increase in casualties to honey bees in recent years following the greater use of new chemicals, but improved co-operation between beekeepers and growers should obviate the need for legislation to protect bees. Provided there is no carelessness in the disposal of containers, unused spray liquids or machine washings, the normal application of toxic chemicals should not result in danger to fisheries. Long-term observations on the effects of herbicides on plant populations of hedgerows and roadside verges are recommended. Recommendations are also made on precautions to be taken to minimize danger to wild life.

3803. PRZYGODDA, W.
Untersuchungen über den Einfluss von E 605 forte auf unsere Vogelwelt. **(The effect of E605 forte on our birds.)**
Vogelwelt, 1954, **75** (1): 1-18, from abstr. in *Z. PflKrankh.*, 1955, **62**: 412-13.

Spraying at ordinary concentrations (0·035%) proved, on the whole, harmless to song birds.

3804. STEINEGGER, P., AND BERGER, R.
Untersuchungen über die toxische Wirkung von Winterspritzmittel Ciba auf Leghornhennen unter besonderer Berücksichtigung der Beeinflussung der Legetätigkeit. **(Studies on the toxic action of the winter wash preparation Ciba on Leghorn hens, with special reference to the effect on laying activity.)**
Schweiz. Z. Obst- u. Weinb., 1955, **64**: 259-62, bibl. 2.

In feeding trials the winter wash preparation Ciba (mineral oil-phosphinone basis) was shown to be harmless to laying hens, though it is suggested that as a precautionary measure the birds should be shut up during actual spraying. [See also *H.A.*, 25: 414e.]—Schweiz. Geflügelzuchtschule, Zollikofen.

3805. STOLL, K.
Wirkung von Toxaphenpräparaten auf pflanzliche Blütenorgane. **(The effect of toxaphene preparations on flower organs.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 83, pp. 49-53.

Blossom applications of toxaphene, which is non-injurious to bees, did not affect fruit set in pear and other crops.—Inst. f. Phytopathologie, Aschersleben.

3806. DORMAL, S.
Le problème des traces d'insecticides dans les fruits et les légumes. 1er Addenda. **(The problem of insecticide residues in fruit and vegetables. First appendix.)** [English and Flemish summaries ¼ p. each.]
Parasitica, 1955, **11**: 58-65, bibl. 2.

The author summarizes the legislation published since her previous article in March 1954 [see *H.A.*, 24: 3681] on the amounts of insecticidal chemicals allowed in or on agricultural products. Parathion residues on slightly immature plums were estimated spectrophotometrically at the Plant Chemistry Station, Gembloux, and were found to be non-toxic to man. Parathion has difficulty in penetrating plum skins and is probably dissipated in about 12 days from application.

Noted.

3807.

a ACKLEY, W. B.
Water contents and water deficits of leaves of Bartlett pear trees on the two rootstocks, *Pyrus communis* and P. *serotina*.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 181-5, bibl. 15.
Water unbalance as a cause of hard-end. [See *H.A.*, 25: 283.]

b BAZIER, J.
Contribution à la lutte contre la tavelure: un "humectographe". **(Contribution to scab control: a "humectograph".)**
Fruit belge, 1955, **23**: 100, illus.
To measure moisture on leaves.

c BREAKEY, E. P.
Control of spittlebugs on strawberries.
Ohio J. Sci., 1955, **55**: 63-4, bibl. 2.
See *H.A.*, 25: 2734d.

d CHAMBERLIN, J. C., AND OTHERS.
Studies of airplane spray-deposit patterns at low flight levels.
Tech. Bull. U.S. Dep. Agric. **1110**, 1955, pp. 45, bibl. 5, illus.
With suggestions for improvement.

e COLLYER, E.
Some predacious insects of fruit trees: capsid bugs.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 155-9, illus.
Brief descriptions, life histories and occurrence.

f CRANE, J. C.
Frost resistance, and reduction in drop of injured apricot fruits effected by 2,4,5-trichlorophenoxyacetic acid.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 225-31, bibl. 16, illus.
See *H.A.*, 24: 2295.

g CULVER, A. J., Jr.
A self-propelled small-plot sprayer.
Plant Dis. Reptr, 1955, **39**: 433-6, illus.
For fungicide and herbicide testing.

h DARPOUX, H.
Les antibiotiques dans le traitement des maladies des plantes. **(Antibiotics in the treatment of plant diseases.)**
[*Proc.*] *Congr. int. Bot. 1954*, Paris, pp. 73-82, bibl. 85.
See also *H.A.*, 25: 413i.

i DARROW, G. M.
Leaf variegation in strawberry—a review.
Plant Dis. Reptr, 1955, **39**: 363-70, bibl. 37, illus.

j Doull, K. M.
Pear and cherry slug. Habits and control measures.
N.Z. Gdnr, 1955, **11**: 518, 548.
In New Zealand *Caliroa limacina* is a pest of hawthorn, cherry, plum, pear, peach and rowan.

k Doull, K. M.
Raspberry sawfly. Control measures for destructive pest.
N.Z. Gdnr, 1955, **11**: 667-8.
Description, life history, damage and control of *Priophorus tener*.

l European and Mediterranean Plant Protection Organisation
Report of the working party on phytosanitary regulations (Paris, February 22-23, 1955).
[French and English.]
[*Publ.*] *Eur. Plant Prot. Org.* [*EPPO*], 1955, pp. 48.
Recommendations on health certificates and quarantine regulations.

m Gärtel, W.
Untersuchungen über Bormangel bei der Rebe. (**Studies on boron deficiency in vines.**)
Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 83, pp. 171-4, illus.
See *H.A.*, 24: 2404.—Inst. Weinb. Bernkastel-Kues.

n Ginsburg, J. M.
Accumulation of DDT in soils from spray practices.
J. agric. Food Chem., 1955, **3**: 322-5, bibl. 34.
See also *H.A.*, 25: 410.

o Groves, J. R.
A comparison of bait and light traps for catching codling moths, *Cydia pomonella* (L.).
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 146-8, bibl. 4.
The latter proved the more efficient as an aid to timing sprays.

p Hamilton, D. W., Summerland, S. A., and Fahey, J. E.
Present status of codling moth control in the Midwest.
Trans. Ill. St. hort. Soc. for 1954, **88**: 188-96, bibl. 1.
See *H.A.*, 25: 1519.

q Hase, A.
Schäden an Walnüssen durch Meisen im Jahre 1954. (**Walnut damage by tits in 1954.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 115-17, bibl. 7, illus.

r Jacks, H., and Robbins, R. E.
Compatibility of spray materials in New Zealand on pears—1954.
Orchard. N.Z., 1955, **28** (1): 17.

s Madsen, H. F., and DeTar, J. E.
Tentiform leaf miner on pears.
Calif. Agric., 1955, **9** (6): 10, 14.
Several compounds compared with DDT for control of this and other pests [see also *H.A.*, 24: 1389].

t Martin, H.
Fungicides—past, present and future. The mode of action of fungicides.
Plant Dis. Reptr, 1955, **39**: 561-6, bibl. 16.
Fundamentals.

u Massee, A. M.
Problems arising from the use of insecticides: effect on balance of animal populations.
Rep. 6th Commonw. ent. Conf. 1954, reprinted in *A.R. E. Malling Res. Stat. 1954*, 1955, **A38**: 137-40, bibl. 10.
A review; see also *H.A.*, 24: 1421.

v Ministry of Agriculture, London, and Department of Agriculture for Scotland.
Crop protection products approval scheme. Approved list 1955.
[*Publ.*] *Minist. Agric., Lond.*, 12th ed., 1955, pp. 16.
Insecticides, fungicides, seed dressings, smoke generators, herbicides, miscellaneous.

w Moore, M. H.
The search for better fungicides.
A.R. E. Malling Res. Stat. 1954, 1955, **A38**: 152-4.
For fruit growers, a reprint from *The Grower Annual Fruit Review* [*H.A.*, 25: 207].

x Myburgh, A. C., and Heyns, A. J.
Winter and pre-winter control of pests and diseases of deciduous fruits.
Dec. Fruit Gr, 1955, **5**: 145-6.
Spray programmes for apples, pears, apricots, peaches and plums.

y Mygind, H.
Status over aeblemelduggen og dens bekaempelse. (**Apple mildew and its control.**)
Erhvervsfrugtavl., 1955, **21**: 259-63, bibl. 8, illus.

z Newhall, A. G.
Disinfestation of soil by heat, flooding and fumigation.
Bot. Rev., 1955, **21**: 189-250, bibl. 395.
A review.

3808.

a Plakidas, A. G.
Virus diseases of strawberry, a review.
Plant Dis. Reptr, 1955, **39**: 525-41, bibl. 105, illus.
British and American work well covered.

b PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.
Bestrijding van plantenziekten, schadelijke dieren en onkruiden in de landbouw. **(The control of plant diseases, pests and weeds in agriculture.)**
Meded. PlZiekt. Dienst **116**, revised 1955, pp. 110.
Methods and materials.

c RINGS, R. W.
New control measures developed to check cat-facing insects.
Ohio Fm Home Res., 1955, **40**: 28-30, illus.
Control of the tarnished plant bug and several species of stink bug.

d ROSS, R. G.
Apple scab and its control in 1953.
90th A.R. N. Scotia Fruit Grs' Ass. 1953, pp. 23-9.
Importance of correct timing emphasized.

e SÁNTHA, L., AND UBRIZSY, G.
A szőlőperonoszpóra elörejelzésének új módszere az effektív hőösszeg alapján. **(A new method of forecasting downy mildew on vines on the basis of effective temperature sum.)**
Növénytermelés, 1955, **4**: 89-94, bibl. 14.
A review.

f SAVARY, A., AND BAGGIOLINI, M.
Lutte contre le carpocapse des pommes et des poires. Conseils pratiques. **(Control of codling moth of apples and pears. Practical recommendations.)**
Rev. romande Agric. Vitic., 1955, **11**: 51-2, bibl. 1.
Disinfection of stores, tree banding, protection of birds and chemical spraying.

g SCHMIDT, G.
Deutsche Namen von Schadinsekten. **(German common names of insect pests.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 84, pp. 174, bibl. 73.
Listed with Latin names.

h STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Spindemider på frugttræer. **(Spider mites of fruit trees.)**
Erhvervsfrugtavl., 1955, **21**: 322-3.
Biology and control of *Metatetranychus ulmi* and *Bryobia ribis.*

i ST. JOHN, J. L.
Pesticides.
Anal. Chem., 1955, **27**: 654-60, bibl. 152.
A review article.

j VAN TIEL, N.
Die Anwendung von drei neuen Insektiziden (Aldrin, Dieldrin und Endrin) in der Landwirtschaft. **(The application of three new insecticides (aldrin, dieldrin and endrin) in agriculture.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 83, pp. 38-44.
For the control of fruit and vegetable, among others, pests.—Shell Lab., Amsterdam.

k ZAUMEYER, W. J.
Antibiotics and plant health.
J. agric. Food Chem., 1955, **3**: 112-16, bibl. 18, illus.
Antibiotic control of plant diseases on crops other than orchard trees.

WEEDS AND WEED CONTROL.

General.

(*See also* 3897f, h, i, k, m.)

3809. NEW ZEALAND DEPARTMENT OF AGRICULTURE.
Control of weeds.
A.R. Crop Experimentalist, Dep. Agric., N.Z., 1954, from extract in *Weed Control Conf. S. Aust. 1954*, Roseworthy agric. Coll., 1954, pp. 19-24.

I. Promising new chemicals for weed control. II. Soil sterilization. III. Review of work to date with TCA. IV. Tolerance of pasture species to weedkillers. V. Trials on the control of weeds in crops: Pre-emergence application of TCA at 10 lb. per acre gave very good weed control in swedes; IPC was also effective but rates of over 1 lb. per acre reduced the germination of swede seed.

3810. ANDERSON, E. G.
A summary of weed control investigations in Eastern Canada.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 24-35.

Investigations on weed control in horticultural crops are carried out mainly by the Horticultural Division at the Experimental Farm, Ottawa, and the Experimental Substations at St. Clothilde, Que., and Smithfield, Ont.

3811. MOORE, R. M.
Principles of weed control.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 2-8.

A discussion on ecological, biological, cultural, mechanical and chemical methods of weed control and on the use of some contact and translocated herbicides and soil sterilants.

3812. CRAFTS, A. S., AND HARVEY, W. A.
Weed control by soil sterilization.
Circ. Calif. agric. Exp. Stat. Ext. Serv. **446,** 1955, pp. 20, illus.

This circular describes the principles and practice of temporary soil sterilization with chloropicrin, carbon disulphide, methyl bromide, 2,4-D, sodium chlorate and borates, and of permanent soil sterilization with sodium arsenite, arsenic trioxide, borates and CMU.

Biological control.

3813. Dodd, A. P.
Biological control of weeds.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 86-91.

The possible danger of introducing weed insects which might become pests of economic plants is pointed out. Available information on the two longicorn stem borers *Mecas* and *Nupserha* is summarized and, provided results of further studies are favourable, their introduction into Queensland for the control of *Xanthium* is recommended.

3814. Wilson, F.
Some aspects of the biological control of weeds in Australia.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 77-85.
Anon.
Control of weeds by plant-eating insects.
Rur. Res. C.S.I.R.O., 1955, No. 11, pp. 10-15, illus.

The successful control of prickly pear by *Cactoblastis cactorum* is mentioned, and an account is given of promising and ineffective insects considered for the control of St. John's wort (*Hypericum perforatum*), common heliotrope (*Heliotropium europaeum*), Crofton weed (*Eupatorium adenophorum*), Noogoora burr (*Xanthium pungens*), ragwort (*Senecio jacobaea*) and *Lantana canara*.

3815. Parsons, W. T.
A review of the control of St. John's wort in Victoria.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 92-4.

Hypericum perforatum used to be controlled by common salt at 5–6 tons per acre; this method, however, is expensive and, owing to the soil sterilizing property of the salt, undesirable. Of insect enemies *Chrysomela hyperici* and *C. gemellata* are the most effective, and the best herbicide is 2,4-D at 2–3 lb. per acre.

3816. Smith, J. M.
Biological control of common St. John's wort in British Columbia in 1954.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 84-8.

A study of *Chrysolina gemellata* and *C. hyperici* population trends and of the effect of the beetles on *Hypericum perforatum* growth.

3817. Naudé, T. J.
Biological control of jointed cactus.
Fmg S. Afr., 1955, **30**: 259-60, 272, illus.

The use of a *Dactylopius* sp. in the control of *Opuntia aurantiaca* has not been completely successful in South Africa. In dense stands the insect has not survived after destruction of the aerial parts which are its food supply. In scattered stands the insect has not become established.

Particular weeds.

(*See also* 3897a, d, p.)

3818. Carder, A. C., and others.
Control of herbaceous weeds.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 1-59.

Summaries are given of work on the control of the following weeds and are followed by a number of abstracts, as shown: quack or couch grass (*Agropyron repens*) 16 abstracts; Johnson and Bermuda grasses (*Sorghum halepense* and *Cynodon dactylon*) 7; Canada and sow thistles (*Cirsium arvense* and *Sonchus arvensis*) 8; field bindweed (*Convolvulus arvensis*) 3; hoary cress and Russian knapweed (*Cardia draba* and *Centurea repens*) 6; leafy spurge (*Euphorbia esula*) 3; toadflax (*Linaria vulgaris*) and other perennial weeds 16. Perennial weeds are classified according to responses to 6 herbicides; and annual, winter annual and biennial weeds are dealt with in 27 abstracts.

3819. Wiancko, M. R.
Couch grass control.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 116-19.

In Ontario 6 herbicides, some in several formulations, were applied at various rates to established couch grass sod. Four rates of dalapon, 2 of TCA and 6 of Karmex gave over 90% control. Split applications of dalapon at 17·4 lb. per acre each and single applications of Karmex W and Karmex WD at 80 lb. each gave 100% control.

3820. Naudé, C. P.
Quick-grass control.
Sci. Bull. Dep. Agric. S. Afr. **358** (*Chem. Ser.* **203**), 1955, pp. 10, bibl. 4.

Applications of TCA 90, sodium chlorate, and a mixture of sodium chlorate, calcium chloride and zinc chloride were sprayed on plots of quickgrass [*Agropyron repens*] on sandy soil. Plots which received either sodium chlorate or the mixture yellowed about a month after treatment, but the grass had almost completely recovered 5½ months after treatment. Observations on the TCA 90 plots (at 8 and 5 oz./100 sq. ft.) at this time showed no signs of quickgrass regrowth. Germination and yield of radishes sown 6 months after application of the herbicides were not affected by any persistent action. On a heavier soil, plots treated with TCA 90 (at 8 and 6 oz. rates) showed no signs of quickgrass regrowth 3 months after application. The sodium chlorate mixture was ineffective on the heavier soil.

3821. Toohey, C. L.
Control of para grass in a mill drain.
Cane Grs' quart. Bull., 1955, **18**: 131.

A very heavy growth of *Bracharia mutica* along a drain was successfully controlled by 2 applications of TCA at 80 lb. in 200 gal. water in late September and early December followed by 1 application at 15 lb. in 200 gal. in late December.

3822. Westmoreland, W. G., and Klingman, G. C.
Bermuda grass control.
Ext. Folder N.C. agric. Ext. Serv. **114,** 1955, pp. 5.

According to conditions, one of the following methods of *Cynodon dactylon* control may be used: (1) Plant a dense, rapidly growing, summer shade crop for 2 years. (2) Disc thoroughly at 2–3 week intervals over 2 seasons. (3) Use 1½ lb. of sodium TCA per 400 sq. ft. for short-term soil sterilization. (4) Use 1½ lb. of sodium chlorate per 100 sq. ft. for long-term soil sterilization. (5) In non-agricultural land use "Karmex" W (CMU) at 40 lb. (80% w.p.) per acre.

3823. EVERIST, S. L.
Control of nut-grass.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 114-15.

In seed-beds and nursery plots fumigation with chloropicrin or methyl bromide gave very satisfactory control of *Cyperus rotundus*. For large-scale treatment it is recommended that the soil should be cultivated while the nutgrass is dormant, and after the new shoots have developed 2–3 lb. per acre of 2,4-D or MCPA should be applied. TCA was also found effective.

3824. MUNE, T. L. AND PARHAM, J. W.
Johnson grass, *Sorghum halepense* (Linn). Pers., a declared noxious weed.
Agric. J. Dep. Agric. Fiji, 1955, **26**: 30-1, bibl. 2, illus.

Control is by repeated mowing or cutting, which reduces the root system and prevents seeding, and by chemical treatment either with 1 lb. sodium chlorate per gal. water per 10 sq. ft. applied when the grass is in full flower or at the soft seed stage, or with 1 lb. TCA per gal. water at 80–120 gal. per acre. TCA should be applied after rain and, if possible, after mowing, hand cutting or light cultivation.

3825. PARSONS, W. T.
The effect of hormone type weedicides on saffron thistle and golden thistle.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 190-3.

Saffron thistle, *Carthamus lanatus* (annual) was readily controlled with any formulation of MCPA or 2,4-D at ½ lb. per acre in the seedling to rosette stage. In later stages of growth higher rates were necessary and, of the formulations used, the ester and amine forms gave the best results. Golden thistle, *Scolymus hispanicus*, (perennial) treated only at the early growth stage, was most effectively controlled by the ethyl ester of 2,4-D and sodium salt of MCPA, though other formulations were also satisfactory.

3826. VICTORIA, DEPARTMENT OF AGRICULTURE.
Bracken fern.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, p. 150.

Notes are given on *Pteridium aquilinum* control by cultural methods. Herbicides were ineffective.

Weeds in water and irrigated areas.

3827. JONES, K. W.
Control of water weeds.
A.R. Res. Div. Minist. Agric. Sudan 1951/52, 1954, pp. 64-7.

2,4-D. In April 1951 the sodium and amine salts were applied as solutions and the sodium salt as a dust in canals in the Turabi subdivision. The amine salt at strengths up to 15 p.p.m. and the dust were ineffective. With all other treatments canals remained clear of weeds up to the end of November. By December a heavy growth of *Chara globularis* had begun, but 20 p.p.m. copper sulphate gave effective control. Angiosperm weeds began to appear in March but generally in very much smaller quantity than before the experiment. *Fernoxone.* In the canals treated the previous year [see *H.A.*, 24: 2572] the angiosperm weeds were much fewer, but the heavy growth of *Chara* more than counterbalanced this. *Aromatic solvents.* Experiments suggest that these may be used at 300–600 p.p.m. as emergency treatments against *Potamogeton crispus* and *Chara globularis*.

3828. CLARK, W. F.
Controlling weeds and algae in farm ponds.
Bull. Cornell agric. Exp. Stat. **910,** 1954, pp. 15, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-8.

Application of aqueous Na_2AsO_3 as a spray to give a concentration in the pond water of 3–4 p.p.m. (5–6 p.p.m. in hard water) gives satisfactory control of most submerged rooted plants. Addition of $CuSO_4$ to give 0·5 p.p.m. concentration will control algae. Application of 5% 2,4-D sprays in paraffin will control most emergent plants. Cat-tails and waterlilies require repeated applications of 10% 2,4-D in paraffin for effective control.

3829. DEWLEN, J. L.
Cattail control experiment—Coachella Valley 1953-54.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 67-72.

Various herbicides, their mixtures, oils and herbicides plus oils were applied for the control of *Typha* spp. growing along the main canal and drainage ditches. A 2,4-D ester applied at 2 lb. per acre with 2 gal. of summer oil in 100 gal. of water was found to be the most effective and economical spray, giving 98% control along the main canal.

3830. DUNK, W. P.
Chemical methods for controlling hydrophytes.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 195-207, bibl. 6.

Work on the use of herbicides to control the 4 principal weeds which infest irrigation and drainage systems in Victoria is reviewed. *Typha angustifolia* and *Juncus articulatus* were effectively controlled by given rates, formulations and methods of application of 2,4-D. *Paspalum distichum* and a group of submersed weeds can also be controlled, but at present the methods are too costly for general use.

3831. LEVI, E.
The problem of perennial grasses in irrigated regions.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 126-30, bibl. 7.

Three troublesome perennial grasses growing in ditches and along their banks in the Murrumbidgee Irrigation Area are discussed in this paper. *Paspalum dilatatum* was most effectively controlled by arsenic pentoxide at 800 lb. per acre and TCA at 100–200 lb. per acre. Against *P. distichum* TCA at 100–150 lb. per acre showed promise, and against *Phragmites communis* unspecified rates of 2,4-D and 2,4,5-T and 100–200 lb. TCA per acre were reported to be effective. The most common method of control of all 3 species is scything.

3832. Levi, E.
The inhibition of the growth of perennial grasses by maleic hydrazide.
Aust. J. agric. Res., 1955, **6**: 378-87, bibl. 17, illus.

The effects of spring and autumn applications of maleic hydrazide on *Paspalum dilatatum* Poir, *Sorghum halepense* (L.) Pers., *Paspalum distichum* L., and *Phagmites communis* Trin. at rates of 0·2–1·6% active material (2–16 lb./acre) are reported. Growth of all species was inhibited at the higher dosage levels; the concentration required and the period of inhibition varied with species. In general the period of inhibition was longer from autumn than from spring applications. A stimulation of growth at lower dosages was recorded for both *P. dilatatum* and *S. halepense*. All treated *S. halepense* plants developed a secondary crown of adventitious roots on the first node. [From author's summary.] A preliminary field experiment with *Paspalum dilatatum* in farm irrigation channels showed that MH applied in the spring at a concentration of 0·4% (4 lb./acre) inhibited growth for 2½ months after application, and at 1·6% (16 lb./acre) the inhibition was still significant 5 months later. The number of inflorescences, the critical factor in water obstruction in channels, was approximately 63% fewer after 5 months in plots treated with 1·6% MH than in control plots.—Irrig. Res. Stat., Griffith, N.S.W.

3833. Baranek, P. P.
What weeds cost in relation to irrigation itself.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 11-13.

Economic considerations concerning the presence and control of weeds in and along the banks of irrigation canals.

3834. Jones, L. G.
What weeds cost in irrigated crops.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 13-15.

With 7 million acres of irrigated crops grown in California, the cost of weed control and the loss in crop yield due to weeds amounts to $162,968,150 a year. In 1954 the estimated cost of weed control in peas was $7.50 per acre, in beans $10, in tomatoes $30, and in onions $60.

3835. Oborn, E. T.
Control of aquatic weeds that impede flow of western irrigation waters.
Weeds, N. York, 1954, **3**: 231-40, bibl. 19.

In addition to the control of aquatic weeds in irrigation canals [see *H.A.*, 25: 432], information is given on the tolerance of vine, cotton and tomato plants to the irrigation water containing effective herbicides such as 2,4-D and CMU. From the results it appears likely that water from canals treated with herbicides is safe for crease irrigation of these crops, provided the initial 5 minutes of wash water is wasted.

Control of woody plants.

(*See also* 3897b.)

3836. Everist, S. L.
Control of woody plants.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 138-45.

Woody plants in general and *Acacia harpophylla* and *Lantana camara* in particular are considered. Control methods described are mechanical and chemical (2,4-D and 2,4,5-T) and in the case of *Lantana* also biological.

3837. Beatty, R. H., and others.
Woody plants.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 60-78.

Sections of interest are: Control of brush on roadsides, utility lines and other rights of way, a summary followed by 3 abstracts; Control of woody plants in other problem areas, including alternate hosts [of crop diseases] and poisonous plants, an extensive summary and 1 abstract; and Control of herbaceous weeds in tree plantings, a general summary followed by 4 abstracts [for one of which see abstract 3845].

3838. Lougheed, A. W.
Railway brush spraying operations.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 40-1.

In 1952 and 1953 some 12,600 acres of brush were sprayed along railway lines in Northern Ontario and Quebec with 5 commercial formulations of 2,4-D and 2,4,5-T mixtures. The treatments were effective and economical, costing about $8 per acre.

3839. Bennett, J. M.
Comparison of six herbicides for dormant basal brush control.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 50-3.

In tests involving more than 1,560 resistant woody plant stems, 2,4,5-T in oil proved to be the most effective of 6 substances evaluated by basal bark application. Concentrations of between 1·32 and 1·76% acid equivalent were necessary to give satisfactory control. CMU gave results comparable to those obtained with 2,4,5-T but application difficulties and soil sterilization effects make it undesirable for general use. Treatment during April was more effective than treatment during March.

3840. Leonard, O. A.
Some observations on new chemicals for woody plant control and some factors influencing success with cut-surface treatments for killing trees.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 94-9.

In preliminary trials with 3 new chemicals, i.e. amino triazole, 2,4-DP and 2,4,5-TP, promising results were obtained against several woody species. Studies with established herbicides used in cut-surface treatment of oak (*Quercus* spp.) have shown that: the amines of 2,4-D and 2,4,5-T are superior to the esters of these chemicals, close spacing of cuts is better than wide spacing while with *Q. wislizenii* frilling is best, applications made at or near the base of the trunks are most effective for preventing sprout formation and the optimum depth of application is about ½ in. into the wood itself. Effective rates varied between 1 and 4 ml. per cut. The trees were most susceptible to treatment during the winter. *Pinus sabiniana* was also effectively controlled by 2,4-D amine applied to scattered cuts round the base of the trees.

3841. PARSONS, W. T.
The control of blackberry, boxthorn and sweet briar.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 146-9, bibl. 1.

In Victoria blackberry, *Rubus fruticosus*, was readily controlled with 2,4,5-T ester at 1½ lb. per acre [see also *H.A.*, 24: 1468]. Applications made during the early flowering to fruiting stages were the most effective, and for complete eradication the treatment may have to be repeated twice. Against boxthorn, *Lycium ferocissimum*, 2,4-D and 2,4,5-T were ineffective. The standard method of control is spraying mature plants with arsenical herbicides (36% As_2O_5) at 1: 10 water, when 80–90% control can be obtained. Against sweet briar, *Rosa rubiginosa*, the low volatile esters of 2,4,5-T were the most effective, but complete control of established plants cannot be expected with one application.

3842. BRAGG, K. K.
Investigations in the control of poison ivy.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 89-95, bibl. 5.

Of materials tested at Ottawa, repeated applications of 2,4-D and 2,4,5-T alone or in combination at 1·5 lb. acid equivalent per acre were found to be the most satisfactory for controlling large areas of poison ivy (*Rhus radicans*). Against small patches of poison ivy sodium borate and a sodium borate-sodium chlorate mixture at 6 and 3·5 lb. per 100 sq. ft. respectively were very effective. [See also *H.A.*, 24: 3727.]

3843. S[KINNER], S. O.
Unsatisfactory control of guava bushes by hormone sprays.
Cane Grs' quart. Bull., 1955, **18**: 120.

A commercial mixture containing 20% of 2,4,5-T and 20% of 2,4-D failed to kill 3-ft. high bushes.

Weed control in fruit crops.

(*See also* 3415, 3638, 3881, 3884.)

3844. HOLM, L. G., AND OTHERS.
[Weed control in] small fruits and ornamental shrubs and flowers.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 146-50.

Small fruits (4 abstracts). CMU and phenyldimethyl urea, each applied at 2 lb. per acre in a vineyard during a dry season, gave very good weed control without injuring the vines. Applications of SES at 6 lb. per acre for 2 seasons and 12 lb. per acre in the third season effectively controlled weeds in raspberries without injuring the crop. In strawberries SES at 4 lb. and sesin at 6 and 10 lb. per acre were satisfactory, provided rain followed the treatments. *Ornamental shrubs and flowers* (4 abstracts). In an attempt to control weeds throughout the season, 2,4,5-trichlorophenoxyethyl sulphate, SES and alanap were applied to coniferous and deciduous shrubs and *Paeonia* spp. in April, June and July. Treatments at the 2 latter dates gave highly effective control without crop injury. *Rosa multiflora*, a *Vitis* sp. and *Symphoricarpos orbiculatus* showed considerable tolerance to CMU.

3845. DAVIDSON, J. H.
The reaction of certain fruit crops to dalapon where applied in close proximity thereto for grass control.
From abstr. in *Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953*, Kansas City, Mo., p. 77.

In Michigan dalapon was applied as the sodium salt at 3, 5, 10, 20 and 40 lb. acid equivalent per acre for quackgrass control around some deciduous fruit crops. Apples (Jonathan) and pears (Bartlett) tolerated the 40 lb. rate with only a trace of foliage necrosis and chlorosis. Cherry (Montmorency), plum (Monarch) and peach (Elberta) showed foliage necrosis and chlorosis at the 3 lb. rate, with serious injury at 20 lb. Grape (Concord) was tolerant of the 10 lb. rate. The applications were made on 19 May, and on 6 October no regrowth of quackgrass was evident on the 20 and 40 lb. rate plots. At the lower rates regrowth was less where the treated areas were shaded. [See also *H.A.*, 25: 2760.]

3846. EATON, E. L.
Chemical weed killers [for blueberry plantations].
Progr. Rep. Dom. Blueberry Substat. Tower Hill, N.B., 1949-1953, 1955, pp. 7-8.

Summer spray applications of 6 commercial herbicides and a mixture did not give adequate control of brush and damaged the blueberries. Treatment of individual stumps immediately after cutting on 15 July with Activated Brushkill in kerosene, Esteron 245 in kerosene, and iron sulphate was effective against 6 woody species. Esteron 2,4,5-T in diesel oil applied at 1 to 3% on 9 February, when there was a 16 in. deep snow cover, killed all the brush it touched but the snow cover failed to protect the blueberries. White kerosene and varsol at 1 pint per sq. yd. sprayed at weekly intervals from 24 April to 21 May killed most of the grass present. There was very little injury to the blueberries from the early treatments but damage was more severe at each successive date.

3847. WHITE, R. G.
Control of weeds and woody growth in lowbush blueberry plantations.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, pp. 57-61, bibl. 6.

The attempts to control weeds in blueberry fields described in this paper are similar to those reported in the abstract above. The results obtained so far are not conclusive, though they indicate that area spraying is the only promising method.

3848. AVENT, K. L.
Keeping the strawberry patch clean.
J. Dep. Agric. Vict., 1955, **53**: 257.

DNBP was the most effective of several weed-killers used before planting and on yearling plants. In the yearling patch, DNBP applied in mid-June kept the weeds down until mid-September. It was slightly phytotoxic, and burnt off old leaves. Chloro-IPC retarded strawberry growth.

3849. WEBSTER, W. J.
Weed control in the Sunraysia area.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 178-9.

Vineyard weeds in the Sunraysia district are listed in order of economic importance. Hard head, *Centaurea picris*, a vigorous perennial heading the list, can be kept in check by cultivation before and after each of 5–6 irrigations. Experiments with hormone weed killers showed that the alkanolamine salt [of 2,4-D] was most effective against *Centaurea* when applied at the rosette stage. For good control a lighter second treatment to kill the later emerging plants was necessary.

Weed control in ornamentals.

(*See also* 3881, 3884, 4175.)

3850. Bivins, J. L.
Morning glory control in flowers and field crops.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 16-18.

MCP, 2,4-D, 2,4-DP, 2,4,5-T and 2,4,5-TP were applied by using shields and the down-the-row method for morning glory [*Ipomoea* sp.] control in seed crops of aster, zinnia, larkspur and nasturtium. MCP and 2,4-D gave the best control, but 2,4-D also caused some crop damage in particular to the zinnias. Seed yields in the MCP-treated plots were doubled in comparison with the control plots. The various translocated spray materials had no effect on the germination of the current year's seed or on the first generation seedlings.

3851. v. d. Graaf, A. J., and van Lint, H.
Onkruidbestrijding met chemische middelen. (**Chemical control of weeds.**)
Jaarb. Proefstat. Boomkw. Boskoop 1954, pp. 101-5.

Good control of weeds in newly planted paeonies was obtained by autumn applications of DNC, IPC and CIPC. These materials also gave satisfactory control of weeds between the rows of ornamental and coniferous trees in the nursery. A list showing the susceptibility of several ornamentals to a DNC+IPC mixture is given. A spray of 0·5% DNC is recommended in cases where there is little grass present; where grass is present 0·7% IPC should be added to the spray.

3852. Rusten, A., and Bylterud, A.
Kjemisk ugrastyning i planteskolene. (**Chemical weed control in nurseries.**)
Gartneryrket, 1955, **45**: 363-71, bibl. 46,* illus.

A review of the literature is followed by the tabulated results of small-scale, preliminary trials in the course of which herbicides were tested both as pre-emergence applications on seedbeds and on woody ornamentals in the nursery.—Norwegian College of Agriculture.

3853. Grigsby, B. H., and others.
Turf weeds.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 151-2.

Five abstracts were received. The authors of 2 dealing with MH as a grass growth inhibitor were unable to draw any conclusions regarding its value for reducing the number of mowings required. Results of investigations on broad-leaved weeds show that MCP at 2 lb./acre was effective against chickweed [*Stellaria media*], whereas 2,4-D at the same rate failed to control this weed but was effective against ground ivy [*Nepeta glechoma*]. It was also found that speedwell [*Veronica officinalis*] was resistant to both 2,4-D and MCP but was readily controlled by endothal.

Weed control in tropical crops.

(*See also* 3843, 4413, 4483.)

3854. Commonwealth Department of Territories, Canberra.
Weed control in the territory of Papua and New Guinea.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 35-8.

Notes on cultural methods of weed control in rubber, coconut, cacao, coffee and vegetables, and on various measures to be taken against some specific weeds.

3855. Herrera Soto, J. M.
Contribución al conocimiento de la acción de herbicidas sobre malezas resistentes. (**Contribution to knowledge of the effect of herbicides on resistant weeds.**) [English summary ½ p.]
Cacao en Colomb., 1954, **3**: 123-40, bibl. 5, illus.

The best control of *Mirabilis jalapa* and *Sida carpinifolia*, 2 weeds of cacao plantations, was given by a sensitizing pre-treatment with the ethanolamine salt of 2,4-D (46% acid equivalent) at a rate of 500–2,000 c.c. and a concentration of 50–200 p.p.m. per plaza [6,400 sq. m.], followed 36 hours later by a killing treatment with a mixture of either 500 c.c. of the ethanolamine salt of 2,4-D or 875 c.c. MCPA with 1,000 g. DNOC at 50 p.p.m.

3856. Day, B. E.
CMU and DCMU for weed control in citrus.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 82-8.

Alanap, PCP and dinitro gave very good weed control in citrus for 3–4 months without any apparent tree injury, but CMU and DCMU at 3 lb. per acre were even better, giving control for about 6 months. When CMU was applied under Valencia orange and grapefruit trees at 1, 2, 4, 8, 16 and 32 lb. per acre the 3 lower rates controlled annual weeds for 4½, 5–6 and 6 months respectively and the 3 higher rates controlled them for over 13 months. The 32 lb. rate, however, caused serious crop damage; the leaves became chlorotic and many of the affected leaves and all the fruit dropped. Tests were carried out to determine the tolerance of citrus to high rates of CMU and DCMU and the toxicity of the materials in different soil types. On the basis of results obtained to date, the use of urea herbicides in commercial citrus production is not recommended, but further work is in progress.—Calif. Citrus Exp. Stat., Riverside.

3857. Robinson, J. B. D.
Second progress report on chemical control of weeds in coffee.
Mon. Bull. Coffee Bd Kenya, 1955, **20**: 151-2, 160, bibl. 3.

Influence of 2-4-D on leaf-fall. During August/October

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* The bibliography is included in a reprint of this article which can be obtained from the Department of Dendrology and Nurseries of the Norwegian Agricultural College, Vollebekk.

1954 13% less foliage fell from the treated trees than from the controls. *Full-scale herbicide trial.* After a herbicide treatment in the 1954 long rains [see *H.A.*, 25: 454], application of a standard Napier grass mulch consisting of a 6-ft. strip 6 in. deep in alternate inter-rows in September controlled weed growth during the short rains. Weed control was maintained during the 1955 long rains by 2 applications of herbicide at an interval of a month. PCP and PCP plus 2,4-D both appeared to lengthen the effective life of the mulch. In the unmulched inter-rows weed growth consisted mainly of *Cyperus* spp. which was not very effectively controlled by 2,4-D. It is concluded that chemical treatment with PCP [see *H.A.*, 25: 2769] in the mulched inter-rows combined with mechanized or hand weeding in the unmulched inter-rows will give complete control. *Liquoring reports.* No tainting of the 1954/55 crop occurred following 2 herbicide treatments in the long rains and one in the short with 2,4-D or PCP alone or in combination. *Leaf colour.* New leaf colour in the 1955 long rains was greener in the plots with good weed control than in those with little or none.

3858. van Suchtelen, N. J.
Proeven met maleine-hydrazine. **(Experiments with maleic hydrazide.)** [English summary 4 lines.]
Surinaam. Landb., 1955, **3**: 221-2.

Maleic hydrazide was applied at 3 concentrations to young coffee trees. At 1% growth was inhibited and flower buds were affected. With lower concentrations no effect was apparent 4 months after application. Some weed growth inhibition, especially of grass species, was obtained, but only at the higher concentrations was inhibition apparent after 4 months.

3859. Rochecouste, E.
Weed control.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 51-60.

Control of broad-leaved weeds and perennial grasses in ratoon cane. The best mixture for destroying existing weeds, for checking regrowth of perennial grasses and for persisting long enough in the soil to affect germinating weed seedlings was ⅓–½ gal. PCP plus 1½–2 lb. acid equivalent MCPA or 2,4-D amine salt plus 5 lb. TCA in 45 gal. water per arpent* [see also *H.A.*, 25: 457]. *Control of perennial grasses with sodium TCA.* Experiments are described in which 50–150 lb. TCA in 200 gal. water per arpent, with or without 8 lb. sodium PCP, was applied to cut and uncut pure swards of 4 grasses including *Cynodon dactylon* and *Imperata cylindrica.* The results suggest that: (1) for pre-planting treatment TCA should be applied 2 months before planting, after the trash of the old crop has been burned; (2) for plant cane treatment TCA should not be applied until the cane is 3–4 months old, and the knapsack sprayer should be fitted with a device to prevent heavy spraying of the young cane shoots; (3) for ratoon treatment TCA should be applied after lining the trash and when the young cane is still at the spike stage, the protective device again being used; (4) summer applications give better results than winter ones; (5) grasses which have been successfully controlled with TCA are *Cynodon dactylon* and *Phalaris arundinacea* at 100 lb. in 200 gal. water per arpent, *Ischaemum aristatum* at 50–75 lb. and *Imperata cylindrica* at 100–125 lb. *Control of Digitaria spp.* Experiments suggest the use of (1) pre-emergence—2 lb. acid equivalent MCPA or 2,4-D amine salt plus ⅓ gal. 15% PCP emulsion plus 10 lb. TCA in 100 gal. water per arpent applied a fortnight after lining the trash, followed by 1–2 similar treatments at intervals of 3–6 weeks, if necessary, and retreatment the following year; (2) post-emergence—30–40 lb. TCA in 150 gal. water per arpent.

3860. Rochecouste, E.
Investigations on the use of hormone weed killers in sugarcane fields interplanted with maize.
Rev. agric. sucr. Maurice,* 1955, **34**: 66-73, illus.

The effects of MCPA (Agroxone 4) and 2,4-D on maize are described. The general practice in chemical weeding of virgin canes is the application of a hormone weedkiller either at planting or immediately after the first weeding. When the chemical is applied soon after the canes have been planted it is advisable to sow maize a fortnight later, thus enabling the maize plants to develop sufficiently to permit a directional spray of the herbicide at the second spraying. If, on the other hand, weedkillers are applied after the first weeding in virgin canes, maize should be planted immediately after weeding and before application of the herbicidal spray. [From author's summary.]

3861. Vallance, L. G.
Pre-emergence weed control in sugar cane areas.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 169-70.

In Queensland very effective weed control was obtained in sugar cane by pre-emergence applications of 2,4-D sodium salt. It was found that the treatment gives most satisfactory results when the soil is moist and in good physical condition. The recommended rate is 4 lb. of sodium salt of 2,4-D (approximately 80% acid equivalent) per acre in 16 to 40 gal. When properly applied under suitable conditions the spray prevents the emergence of all the weeds and grasses which normally constitute a nuisance in cane fields. [See also *H.A.*, 22: 431.]

3862. Stewart, M. J.
A survey of chemical weed control in sugar cane.
S. Afr. Sugar J., 1955, **39**: 395-407, bibl. 27.

Subjects covered include herbicides, equipment and pre- and post-emergence control in South Africa with special reference to *Cyperus* spp., and practices in other countries. In South Africa pre-emergence spraying with 2,4-D has definite advantages compared with hand weeding, provided the area is not dominated by a resistant type of weed, and it is especially useful on hillsides where cultivation might cause erosion and on heavy soils not easily handled when wet. Complete cover and cane line spraying, of which the pros and cons are discussed, need 1½ and ¾ lb. 2,4-D per acre respectively. Control generally lasts 3–6 weeks. Nutgrass and some grasses are little affected by pre-emergence sprays of 2,4-D even at 2 lb. per acre and require post-emergence treatment. The best formulation for complete cover spraying is 2–4 gal. contact herbicide (½ lb. PCP per gal. oil with added emulsifier) plus 1½ lb. 2,4-D ester in 50–60 gal. water per acre; it may be applied at any stage of cane growth provided that the cane leaves are protected.

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* =1·043 acres.

* Formerly *Rev. agric. Maurice.*

Weed control in vegetables.

(*See also* 3820, 3854, 3872, 3874, 3877, 3881, 3897c, o. q.)

3863. Edwards, G. R.
Selective weed control in vegetable crops.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 171-2.

Very brief notes are given on chemical weed control in onions, carrots, celery and peas in South Australia and on the use of CMU, CIPC and some other herbicides in various vegetables in the United States.

3864. Rahn, E. M.
Chemical weed control in asparagus, lima beans, vine crops, sweet corn, and strawberries.
(*Tech.*) *Bull. Del. agric. Exp. Stat.* **303**, 1954, pp. 32, bibl. 38, illus.

Asparagus cutting beds: One pound of Karmex W (CMU) per acre applied before harvest and the same amount applied after harvest, supplemented with some tractor cultivation late in the season, provided satisfactory weed control for the entire season without causing any crop damage. *Asparagus seed beds:* Geigy PCP No. 10 at 6 gal. per acre emulsified in 54 gal. of water, used as a contact herbicide before emergence of the asparagus seedlings, eliminated the need for hoeing for 4–6 weeks. *Lima beans:* Applied soon after seeding, Dowicide G at 20 and 30 lb. per acre and Premerge at 2 gal. controlled weeds for 2–3 weeks. *Cantaloupes:* Alanap-1 at 2 lb. per acre applied immediately after seeding was the best method of weed control tested. A second application at the same rate a month after seeding extended the period of weed control, with yields from treated plots being equal to those from hoed plots. *Cucumbers, watermelons and squash:* Only Alanap-1 was used, applied in the same way as for cantaloupes. In cucumbers and watermelons the 2-lb. rate and in squash the 1-lb. rate caused the least crop injury. *Strawberries:* Against summer weeds SES at 2 lb. per acre gave good but somewhat inconsistent results; sesin at 8 lb., used only in one season, was slightly more effective. Against winter weeds, chiefly chickweed, Dow selective at 1 gal. in 100 gal. of water applied in January and March was very satisfactory.—In the report of these experiments, some of which were started in 1948 or 1949, details are given of the materials and methods of application used, of any crop damage caused and of other treatments, apart from those listed above, found effective. [Many of the results have been reported and abstracted previously.]

3865. Rehm, S.
Control of nut-grass in vegetable crops.
Fmg S. Afr., 1955, **30**: 224-7, bibl. 23.

Treatment with 2,4-D gave effective but not complete control of purple nut-grass (*Cyperus rotundus*) in Pretoria. A rate of 6 lb. per morgen was satisfactory, and in the summer crops could be planted 12 days after treatment. In one experiment bean yields were almost doubled after 2,4-D treatment. Repetition of 2,4-D treatments, which gave better control than single sprays, were of doubtful economic value. Tillage after treatment improved the herbicidal effect. There were indications that 2,4-D treatment might be more effective when applied after ploughing-in a smother crop, and that liberal N manuring increased the susceptibility of the nut-grass to the herbicide. MCPA and 2,4,5-T were somewhat less effective than 2,4-D. TCA and MH were too costly to be of commercial value. CMU, IPC and Chloro-IPC were not effective.

3866. Warren, G. F., and others.
[Weed control in] other vegetable crops.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 141-5.

Eleven abstracts were received dealing with weed control in beans, cucurbits, carrots, beets, spinach, peppermint and tobacco plant beds.

3867. Nylund, R. E., and others.
[Weed control in] onions, potatoes and sweet corn.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 131-40.

Twelve abstracts were received on weed control in onions. Of the large number of herbicides tested for pre-emergence application, only Stoddard solvent, CIPC and sulphuric acid gave fair to good weed control without injuring the onions. For post-emergence treatment CMU was the most extensively tested. In general it gave very good weed control when applied at 2 lb. per acre over the top of onions in the "flag" to 2–3 leaf stage and when used as a basal spray at lay-by. [For weed control in onions see also abstracts in *Proc. 10th annu. Mtg N. centr, and Abstr. Paps 1st nat. Weed Control Conf. 1953* (*H.A.*, 25: 464-467).]

3868. Dion, A.
Notes on the weeding of onions with new herbicides.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 95-6.

During an abnormal growing season in Quebec, Aero Cyanate, applied pre-emergence at 8 lb. or post-emergence at 16 lb. per acre, was the most satisfactory of 6 herbicides tested in onions.

3869. Kramer, M.
O combate químico das ervas daninhas em canteiros de cebola. (**Chemical weed control in onions.**) [English summary 1 p.]
Arq. Inst. biol. S. Paulo, 1952/54, **21**: 47-56, bibl. 10.

Of 8 herbicides tested at the rate of 0·5 l. per 2 sq. m. the best were 1% potassium cyanate applied 3 times after transplanting and 0·5% ammonium DNBP applied once before and twice after transplanting. Neither controlled nutgrass.

3870. Pass, H. A., and Zedler, R. J.
Experimental herbicide Natrin 80S for weed control in tomatoes, tobacco and other transplanted crops.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 38-9.

Natrin 80S (sodium 2,4,5-trichlorophenoxyethyl sulphate) is a germinating seed toxicant similar to SES (sodium 2,4-dichlorophenoxyethyl sulphate). Both materials are inactive when applied to the leaves of plants but owing to root absorption certain crops are more tolerant of natrin than of SES and *vice versa*. In trials in Canada and the United States natrin applied to well-established tomatoes and cabbage, after the existing weed had been removed, controlled annual broad-leaved and grass weeds without causing crop injury. A dosage of 2–4 lb. per acre is suggested, the higher rates being used on heavier soil types. Established tobacco plants appeared resistant to both SES and natrin, the latter being somewhat safer. In a preliminary test in Quebec spraying annual flowers (zinnias, asters and snapdragons) with natrin at 6 lb. per acre resulted in very good weed control with no crop injury.

Herbicides and apparatus.

(*See also* 3460, 3897e, g, j, l, n, r-t, 4152.)

3871. Dutton, W. C.
New herbicides.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 158-61.

A summary is given of 50 abstracts dealing with 20 so-called new chemicals in which the possibilities and limitations of the materials are considered with respect to both weed control and crop tolerance.

3872. Maxwell, K. E.
Two new classes of herbicidal chemicals.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 48-9.

The herbicides discussed are 2 amides of chloroacetic acid, i.e. α-chloro-N,N-diallylacetamide and α-chloro-N,N-diethylacetamide, and derivatives of dithiocarbamic acid, i.e. 2-chloroallyl diethyldithiocarbamate. Both the chloroacetamides and the dithiocarbamate are effective against grasses and certain broad-leaved weeds; they are mainly useful as pre-emergence herbicides in vegetable and other crops.

3873. Ogle, R. E., and Warren, G. F.
Fate and activity of herbicides in soils.
Weeds, N. York, 1954, 3: 257-73, bibl. 27.

A study is reported of 5 herbicides in 3 soil types. In general CMU was most resistant to breakdown, followed in order by TCA, CIPC, NPA and 2,4-D. [See also *H.A.*, 25: 492e.]

3874. Steinen, O. P.
Alanap.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 40-3.

Methods and rates of application of alanap-1 are recommended for weed control in asparagus, cantaloupe, cucumber, watermelon, muskmelon, squash and pumpkin grown in 3 different soil types (low to high organic). Alanap-3 applied to a lawn for crab grass [*Sorghum halepense*] control showed good promise.

3875. Beatty, R. H.
Amino triazole.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 43-7.

A review on the uses of amino triazole showing, among other things, that applications of 4 to 8 lb. per acre gave very good control of Bermuda grass [*Cynodon dactylon*] in citrus without causing crop damage. Cucurbits and beans were found to be tolerant of the herbicide. Combined applications of amizol with other herbicides are considered. In preliminary trials amizol sprayed on weeds in the flowering and seed stages affected seed germination.

3876. Wain, R. L.
Some chemical aspects of research on plant growth substances.
J. Sci. Food Agric., 1955, **6**: 361-3, bibl. 11.

A brief account of the relationships between molecular structure and growth regulating activity is followed by a review of recent work on the enzymic breakdown of certain aryloxy-acids within plant tissues which has led to important developments in the field of selective weed control.

3877. Wain, R. L.
Herbicidal selectivity through specific action of plants on compounds applied.
J. agric. Food Chem., 1955, **3**: 128-30, bibl. 9, illus.

Some results are given of experiments on the effect of ω-phenoxyalkylcarboxylic acids on β-oxidation within the plant tissues, which suggested that a method of selective weed control could be based on the plant enzyme system. In experiments to investigate this possibility, plants of annual nettle (*Urtica urens*) and creeping thistle (*Cirsium arvense*) were destroyed by treatment with the acetic derivative of ω-(2-methyl-4-chlorophenoxy) alkylcarboxylic acids and its homologues, while those treated with other members of the series were unaffected. Fumitory (*Fumaria officinalis*), fat hen (*Polygonum aviculare*) and charlock (*Sinapis arvensis*) were destroyed by application of these acids at rates as low as 2 lb. per acre. The most promising compounds used so far are γ-(2-methyl-4-chlorophenoxy)butyric acid (MCPB), and γ-(2,4-dichlorophenoxy)butyric acid (2,4-DB). Good control of annual nettle, growing as the dominant weed in celery, was obtained by one application of MCPB or 2,4-DB at 2 lb. per acre without damaging the crop. Other crop plants on which these materials may be used are clover, carrots, parsnips and flax; resulting damage was slight compared with that caused by 2,4-D. [See also *H.A.*, 25: 2790.]—Wye Coll., Univ. London.

3878. Winfield, J. D.
Progress report on new studies with chlorate weed killers.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 36-7.

Mixtures of sodium chlorate and 2,4-D or Brushkill herbicides have been used successfully for roadside brush control. In one test the non-volatility of these mixtures was demonstrated by spraying a road verge and, immediately afterwards, planting in the treated area some tomato plants which remained unaffected. Buckthorn [*Rhamnus cathartica*], bedstraw [*Galium* sp.] and leafy spurge [*Euphorbia esula*] were effectively controlled with dry applications of given rates of sodium chlorate. In preliminary tests pre-emergence spraying with sodium chlorate showed some promise for weed control in gladioli and peas.

3879. Hidaka, Z.
Studies on soil fumigation with chloropicrin. II. Effect on weeds. [Japanese, with English summary ¾ p.]
Hidaka, Z., and Sekiya, T.
Effect of chloropicrin sterilization of the soil upon the seeds and underground stems of weeds. [Japanese, with English summary ½ p.]
Bull. Hatano Tobacco Exp. Stat., 1951, No. 35, pp. 28-39, bibl. 3, illus., No. 37, pp. 25-32, bibl. 4, illus. [received 1955].

Underground stems of *Cyperus rotundus*, *Imperata cylindrica* and *Equisetum arvense* were almost completely killed by fumigation with chloropicrin during the dormant period. From 70 to 80% of the weed seeds in the soil were killed.

3880. Gleisberg, W.
Vermag Chlorpikrin-Anwendung die Bodendämpfung zu ersetzen? **(Can chloropicrin applications replace steam sterilization of soil?)**
Gartenbauwiss., 1955, **1** (n.s.): 510-38, bibl. 8.

Comparison of steam sterilization and Larvacide (containing chloropicrin) treatment in the second year after application showed that both had a certain persistent herbicidal effect. The weed frequency in the steam sterilized plots was lower than that in the Larvacide-treated plots. In tests with lettuce both steam sterilization and Larvacide applications inhibited growth. *Digitalis* yields were lower from sterilized plots than from the controls. Larvacide treatment of steam sterilized soils reduced the growth inhibition of lettuce and *Digitalis*. The herbicidal effect of steam sterilization surpassed that of Larvacide treatment at all the rates of application tested. [For earlier work, see *H.A.*, 24: 4007.]

3881. Michiels, A., and Dustin, A.
Le C.M.U., un nouvel herbicide plein de promesse. **(CMU, a promising new herbicide.)**
Parasitica, 1955, **11**: 29-57, bibl. 4.

CMU was applied to a wide range of crops in extensive laboratory tests and field trials at La Hulpe Experimental Station. Germination tests with several crops, including turnips, in treated soil showed that CMU toxicity was weaker than that of 2,4-D, TCA or ammoniacal DNOC. Bean plants grown in a nutrient solution succumbed more quickly to CMU than to 2,4-D or TCA. Snapdragon plants, which have small seeds, did not survive for more than 48 hours after germination in soil treated with CMU; larger-seeded crops survived for longer periods. The effects of CMU applied in droplets to young tomato, turnip and bean plants were slow to appear, but yellowish necrotic spots were produced which by extension finally caused plant death. In field trials CMU was applied as a total and selective herbicide. In April inter-row sprays of 500 and 250 g./ha. of CMU to strawberries killed the weeds and kept the ground clean for 2 months without affecting the yield. Applications of 2·5 kg./ha. or more given in May to young dwarf apples and pears kept the soil clean until August. Winter weed growth in hyacinth and tulip beds was kept down by CMU applications in October and March without damaging bulb growth.

3882. Burgoyne, D. L.
CMU and its relationship to Telvar and Karmex.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 31-3.

"Karmex" W and "Karmex" DL are the agricultural and "Telvar" W and "Telvar" DW the industrial formulations of CMU (3-(p-chlorophenyl)-1,1-dimethylurea) and 3,4-DDU (3-(3,4-dichlorophenyl)-1,1-dimethylurea) respectively, "Karmex" W is used for selective weed control in pineapples, sugar cane and asparagus and for weed control in irrigation and drainage ditches. "Karmex" DL is used in cotton. "Telvar" is a soil sterilant and the type to be used depends on rainfall and soil conditions.

3883. Fang, S. C., and others.
Absorption, translocation, and metabolism of radioactive 3-(*p*-chlorophenyl)-1, 1-dimethylurea (CMU) by bean plants.
J. agric. Food Chem., 1955, **3**: 400-2, bibl. 7, illus.

A study was made of the absorption and translocation of radioactive CMU by Black Valentine bean plants. After a foliar spray the herbicide was rapidly absorbed and translocated throughout the leaf, but translocation to other plant parts was much slower. Two compounds containing radioactive C were found in leaf extracts; one of these was unchanged CMU, the other remained unidentified.—Agric. Exp. Stat., Oregon.

3884. Hanten, H.
Praktische Unkrautbekämpfung mit Crag Herbicide I. **(Weed control with crag-herbicide I.)** [English, French and Spanish summaries 3 lines each.]
Mitt. Klosterneuburg, *Ser. B*, 1955, **5**: 145-6.

In preliminary trials crag-herbicide I controlled weeds in strawberries, perennial flowers and roses without causing damage to the crop. Annual flowers suffered only slight injury.

3885. Swezey, A. W.
Dalapon in California—a progress report.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 34-8.

Against perennial grasses on uncropped land 35 to 55 lb. per acre of the 85% sodium salt of dalapon should be used. *Citrus:* In some experiments the application of dalapon caused no tree abnormalities but in others leaf tip curl, leaf chlorosis and burn developed. *Grapes:* When the material at 20 and 40 lb. per acre was applied as a placed spray on a 4 ft. strip between the rows of vines, yields were not reduced. Yields were, however, reduced by a 40 lb. per acre overall treatment. *Deciduous fruits:* Pears and apples showed resistance, but peaches, plums and almonds exhibited leaf injury symptoms from soil treatments around the trunk. A technique of spraying only an area of 16 to 25 sq. ft. around the trunk minimized potential injury by reducing the ground area treated and thus the percentage of tree roots contacted by the leached dalapon. The material probably should not be used around very young trees. [See also *H.A.*, 25: 2760.]

3886. Pavlychenko, T. K.
Damage to sensitive crops by 2,4-D and related chemicals.
Proc. 8th Mtg west. Sect. nat. Weed Cttee 1954, Brandon, Man., pp. 12-15.

Chemicals which may be classed with the 2,4-D group are 2,4,5-T, MCPA and the newer material 3-amino 1,2,4-triazole. The following horticultural crops are highly sensitive to 2,4-D and related compounds: tobacco, tomato, vine crops, turnips and many other vegetables; pears, grapes, cherries and apples; many woody ornamentals, roses and the great majority of herbaceous flowers. Raspberries belong to the semi-sensitive group of plants which are tolerant of low rates (2–3 oz./a.) but are easily injured by higher rates or extensive volatility. Symptoms of some crop injuries are described.

3887. Watson, R. D.
Galls similar to crown gall and nematode injury produced by 2,4-D.
Plant Dis. Reptr, 1955, **39**: 391-4, bibl. 2, illus.

Root galls suggestive of nematode injury in some vegetable crops and of crown gall in others were shown to be due to the contamination of irrigation water by 2,4-D with which ditch banks had been sprayed. The galls are illustrated.

3888. Greenham, C. G.
Chemical and physiological interaction of herbicides.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 41-8, bibl. 26.

A discussion on some of the ways in which chemical structure affects absorption, translocation and toxicity with special reference to 2,4-D and its related compounds'

3889. Citovič, I. K.
The biochemical basis of the selective action of 2,4-dichlorophenoxyacetic acid on dicotyledonous and grassy plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **100**: 587-90, bibl. 10.

The selective action of 2,4-D on mono- and dicotyledonous plants was studied. No evidence was obtained to support the hypothesis that 2,4-D has a direct action on the enzymes, though in dicotyledons, in particular tomato, a reduction occurred in the catalase activity due to metabolic changes induced by the treatment. Light effects on 2,4-D susceptibility were studied with sunflower as test plant, and it was found that reduced illumination either before or after treatment increased susceptibility.

3890. Chambionnat, A.
Séquestrants et phytohormones. Étude théorique et pratique des conditions d'utilisation des séquestrants dans les pulvérisations des sels minéraux ou organiques de 2.4.D. **(Sequestrants and plant growth substances. A theoretical and practical study of the use of sequestrants in sprays of the mineral or organic salts of 2,4-D.)**
Terre maroc., 1955, **29**: 182-9, 223-30, bibl. 18.
L'importance de la qualité des eaux utilisées dans les préparations de solutions de 2-4-D. **(The importance of the quality of the water used in the preparation of 2,4-D solutions.)**
C.R. Acad. Agric. Fr., 1955, **41**: 420-1.

The Ca and Mg salts in the hard waters of N. Africa partially or totally neutralize the action of 2,4-D salts used as herbicides. A method, previously used in industry, is described for softening the water with sequestrants. It can be used with the sodium or organic salts of 2,4-D, for selective or non-selective weed control, is simple to carry out and does not cause a sediment in the solution. To prevent scorching of the plants and double decomposition of the 2,4-D salts and the sequestrant, the pH of the solution must be maintained between the limits of 5 and 7·5. Information is given on buffering agents and the amount of sequestrant required under various conditions.

3891. Ready, D., and Minarik, C. E.
New growth regulating compounds. IV. Selected toloxyacetic acids.
Weeds, N. York, 1954, 3: 279-81, bibl. 5.

Para-fluoro-*o*-toloxyacetic acid was at least equal in growth-inhibitory activity to 2,4-D. Other available members of this series, however, were generally inferior to 2,4-D, with the exception of a para-bromo compound which was outstanding for its effect on acorn squash.

3892. Hardman, N. F., and Shafer, W. B.
Vapam—a temporary soil sterilant.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 38-9.

The properties of sodium N-methyl dithiocarbamate dihydrate are described. Under most conditions crops may be planted 7 days after treatment, but in some instances damage occurred to crops planted 3 weeks after treatment. Vapam is stated to be also an effective fungicide and nematocide.

3893. Larson, R. E., and others.
Mechanical considerations.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 166-71.

The 9 abstracts submitted, dealing with the mechanical problems of weed control, cover a wide field. They include the results of work on aerial and ground methods of application of herbicides and mechanical treatment. Michigan State has reported a unique and apparently successful method of weed control which involves the killing of germinated weed seeds by imparting kinetic energy to the soil and throwing it at high velocity against an impact plate.

3894. Orchard, H. E.
Review of methods of applying chemicals.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 63-7, bibl. 7.

Herbicides can be applied by sprayers, atomizers, dusters, soil placement equipment, a smearing device attached to scythes or sickles and aircraft.

3895. Brunner, B.
Burning for control of weeds with L.P. Gas Weed Burning equipment.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 33.

Burning in irrigation ditches and along fence rows and roadways with L.P. Gas trailer-mounted boom type or lightweight hand burners is proving to be an efficient, economical and clean method of weed control.

3896. EADIE, J. M.
Aerial spraying.
LEE, W. A.
Aerial spraying.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 68-72, bibl. 8, and pp. 73-5.

The first paper gives a brief account of the development of aircraft spraying in Australia and of problems of equipment, herbicidal formulations, rates of application, possible crop damage and limiting weather conditions. In the second paper types of available aircraft are discussed.

Noted.

3897.

a ANON.
The most important weeds of the Australian States. An analysis of the gradings of the State Weeds Co-ordination Committees.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 9-18.

b BEATTY, R. H.
Right of way clearance with chemicals.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 88-94.
Brush control with 2,4-D, 2,4,5-T and ammonium sulphamate.

c BLANCHARD, F. A.
Uptake, distribution, and metabolism of carbon-14 labeled trichloroacetate in corn and pea plants.
Weeds, N. York, 1954, **3**: 274-8, bibl. 13.

d COMMONWEALTH DEPARTMENT OF TERRITORIES, CANBERRA.
List of weeds in the territory of Papua and New Guinea.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 25-34.

e CRAFTS, A. S.
Formulation of herbicides.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 60-7.

f DRESHER, P.
Roadside weed control.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 100-2.
A brief review.

g ERICKSON, L. C.
2,4-D retention.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 51-4.
Effect of residues in spraying equipment.

h FRICKE, E. F.
Graminaceous weeds.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 118-23, bibl. 10.
Cultural and chemical control.

i HALL, V. L.
Industrial weed control of railroads, irrigation districts, and industrial plants.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 104-7.
A general discussion.

j JENSEN, A. C.
3-amino-1,2,4-triazole in California.
Proc. 7th annu. Calif. Weed Conf. 1955, Santa Barbara, pp. 47-8.
Effective against a number of both broad-leaved and grassy weeds.

k KOTT, S. A.
The capacity of annual herbaceous stems of plants to reproduce vegetatively. [Russian.]
Agrobiologija, 1954, No. 6, pp. 114-18, illus.
Mainly perennial weed species.

l LEVI, E.
Recently developed herbicides.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 49-52.
Action and uses of MH, TCA and CMU.

m LOOMIS, W. E., AND OTHERS.
Basic studies.
Res. Rep. 10th annu. N. centr. Weed Control Conf. 1953, Kansas City, Mo., pp. 162-5.
Still lag behind applied work in herbicide research.

n NEX, R. W., AND SWEZEY, A. W.
Some chemical and physical properties of weed killers.
Weeds, N. York, 1954, **3**: 241-53, bibl. 25.
Over 100 herbicidal formulations listed.

o ORTH, H.
Neue Herbizide im Gemüsebau. **(New herbicides for vegetables.)**
Reprinted from *Gesunde Pflanzen*, 1955, No. 6, pp. 3.
IPC, Chloro-IPC, NIX, Alanap-1, CMU, Crag-1.

p PARSONS, W. T.
A review of recent research on ragwort in Victoria.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 132-4, bibl. 1.
The ester of 2,4-D was found to give the best control.

q PEABODY, D. V., AND WOLFE, H. H.
Weed control in peas grown for processing in Western Washington.
Ext. misc. Publ. St. Coll. Wash. **15**, 1954, pp. 3.
With dinitro amine ("Sinox P.E." or "Premerge").

r PEARSE, F. S.
Progress report on dalapon, kuron and premerge.
Proc. 8th Mtg east. Sect. nat. Weed Cttee 1954, Ottawa, 1955, pp. 42-3.

s ROBINSON, B. D.
Soil sterilants.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 53-6, bibl. 8. Arsenicals, chlorates, borates, their mixtures, CMU and PDU (phenyldimethylurea).

t ROBINSON, B. D.
The search for weedicides.
Weed Control Conf. S. Aust. 1954, Roseworthy agric. Coll., 1954, pp. 57-9, bibl. 2. Selection, preparation and screening.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

3487, 3489-3497, 3498g, j, m, s, x, 3499d, f, i, 3753, 3761, 3796, 3806, 3808j, 3854, 3863-3870, 3872, 3874-3878, 3886, 3887, 4065w, z, 4066d, g, h, j, k, 4454, 4464, 4465, 4469, 4470, 4474, 4478, 4484, 4485, 4487m.)

3898. WELLESBOURNE.
5th Annual Report of the National Vegetable Research Station, Wellesbourne, Warwick, *1954,* 1955, pp. 73.

Work in progress is briefly discussed by the Heads of the Station's 7 sections. A longer paper on the effect of krilium on vegetable yields and one on lettuce varieties are abstracted separately [see abstracts 3911 and 4004].

3899. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY.
Thirty-fifth Report and Accounts NIAB, Cambridge, for 1954, pp. 50.

In 1954 the vegetable trials were expanded to include crops other than brassicas and onions, and preliminary trials were started on carrots, lettuces and outdoor tomatoes. Off-type in brassicas and the effect of manurial and spacing treatments on seed yield of winter cauliflower were also studied.

3900. REBOUR, H.
La Station Expérimentale Maraîchère du Littoral Ouest d'Alger. **(The Market-gardening Experimental Station of the West Coast of Algeria.)**
Fruits et Prim., 1955, **25**: 199-201, illus.

The main aims of this station, which was opened in 1955 at Zéralda in the early vegetable growing district, are the improvement of the traditional crops and the introduction of new ones. Research will be chiefly concerned with (1) the breeding and introduction of legumes, with special reference to yield, earliness, and disease resistance; (2) cultural practices such as shading, fertilizer application, the use of growth substances, dormancy breaking and vernalization; and (3) the proper presentation of produce for sale. Tomatoes and beans are the chief horticultural crops under study at present, and the growing of strawberries, early melons and flowers, particularly gerbera and gladiolus, is to be encouraged.

3901. FAIRFIELD [N.A.A.S.]
Station Guide Fairfield Experimental Horticulture Station 1955. Kirkham, Lancs, pp. 21.

The main work of the Station is on glasshouse cropping with a subsidiary interest in soft fruit, intensive vegetable and hardy flower production. In a summary of experimental results for 1954–55 the following are included: (1) In an uneven span E-W propagating house growth was 124% better than that in an even span N-S house. (2) Trickle irrigation of tomatoes was effective on the station soil, and saved up to 25% of the summer labour requirement. (3) In tomato variety trials Ware Cross and Hertford Cross were superior to Potentate in quality and earliness of yield. The optimum spacing for Radio and Potentate appeared to be 14,000 plants per acre. (4) The best propagation method for early-flowering chrysanthemums was to strike the cuttings in boxes and bed them out in frames. (5) Some recent chrysanthemum varieties suitable for market are listed.

3902. CHAPMAN, C. I.
Vegetable section. N.I.A.B. variety trials.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 23-9.

Most of the variety trials are carried out at several centres throughout the country and over a number of years. Those included here concern bulbing onions, lettuce, early and maincrop carrots, brussels sprouts, early broccoli, spring cabbage, and early and winter cauliflower.

3903. GOODWAY, N.
Vegetable section: manuring and nutrition experiments.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 35-8.

Some preliminary results from the bulky organics trials have been analysed. Treatments were dung, straw compost, sewage sludge, straw plus nitro-chalk, and inorganic N. Summer cabbage responded to all treatments in 1953, increases of about 2 tons per acre being obtained with organic treatments. In 1954 large yield increases were obtained with all treatments except straw plus nitro-chalk. Yields of runner beans increased by 1 and 1·5 tons per acre following treatment with dung and straw plus nitro-chalk respectively. Organic treatments had a considerable residual effect on winter lettuce, particularly in hastening maturity.

3904. MOSS, N.
[Report of the] intensive cultivation section.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 39-50.

Propagation and planting dates of frame lettuce: the total marketable weight of January-raised plants was significantly higher than that of October-raised plants. *Orientation of Dutch lights:* no consistent results have been obtained after 3 years' trials with lettuce. *Spacing and lifting dates with self-blanching celery:* the relation of 3 spacings to the weight of crop harvested and to 3 dates of lifting was studied. The results were variable but there was a sharp drop in profit possible as between 9- and 7-inch spacings, but little difference as between 9- and 11-inch spacings.

3905. Moss, N.
[Report of the] glasshouse section.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 51-4.

Tomato variety trial: Antimold A and Antimold B were not affected by *Cladosporium* infection; Sapsford No. 1 and L.M.R. No. 1 showed less leafmould resistance. *Grafting techniques for cucumbers:* approach grafting of cucumbers onto *Cucurbita ficifolia* was very successful. *Lettuce spacing in a heated glasshouse:* more and heavier lettuces were produced at triangular than at square spacing; the higher crop value at 6-inch spacing than at 7-inch spacing was offset by increased labour costs.

3906. Pynaert, L.
La production de semences de légumes sous les tropiques. **(Vegetable seed production in the tropics.)**
Tract Roy. belg. Minist. Colon. **36,** 1954, pp. 47, bibl. 3, illus.

The author of this paper, the Honorary Director of the Colonial Gardens in the Belgian Congo, borrows largely with due acknowledgement from *Technical Communication* No. 19 of the Commonwealth Bureau of Horticulture and Plantation Crops (Seed production of European vegetables in the tropics, by A. G. G. Hill) [*H.A.*, 18: 2339]. He gives lists of the European and tropical vegetables cultivated in the Congo, and discusses the adaptation of European varieties to the tropics (pp. 3), vegetables indigenous to the Congo and their selection and breeding (pp. 6), experiments on the production of seed of European vegetables in the Congo and other tropical localities (pp. 3), factors affecting such seed production in the tropics (pp. 8), and the marketing of European vegetable seed in the tropics (pp. 2).

3907. Seidel, E.
Die Zusatzbelichtung, ein neues technisches Hilfsmittel zur Leistungssteigerung in der gärtnerischen Produktion. **(Supplementary illumination, a new technique for improving the performance of horticultural crops.)**
Dtsch. Gartenb., 1955, **2**: 198-200, illus.

The application of artificial light for various periods during the raising of cucumber and tomato plants advanced harvesting and increased yields. The apparatus used and the economics of supplementary illumination are discussed.—Inst. f. Gemüsebau, Grossbeeren.

3908. Šebánek, J.
O stimulaci zeleniny růstovými stimulátory. **(On the stimulation of vegetables with growth stimulators.)** [English and Russian summaries 10 and 12 lines respectively.]
Acta Univ. Agric. Silvic. Brno, Ser. A, 1955, No. 1, pp. 9-18, bibl. 15, illus.

For the treatment of pepper seeds with β-indolylbutyric acid to stimulate growth a very low concentration, i.e. 10 mg./l., was found to be the most satisfactory; higher concentrations delayed plant development. Soaking early cabbage seed in a high concentration of α-naphthylacetic acid, viz. 200 mg./l., for 24 hours, retarded the elongation of seedlings and thereby increased final yields. With late cabbage a 25 mg./l. concentration gave the best results. Watering kohlrabi plants 4 times with a solution containing nicotinic and α-naphthylacetic acids at 100 mg./l. increased yields by 32% compared with the controls. Application of nicotinic acid alone was also effective but not that of NAA alone.

3909. Rubin, S. S., and Černyš, A. I.
The role of deeper ploughing in increasing the productivity of vegetable crops. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 6-8.

A description is given of the improvements caused by deep ploughing in the nutrient status and moisture content of chernozem soils. The yield of early cabbage and tomatoes increased progressively with increases in depth of tillage from 20 to 30, 40 and 50 cm.

3910. Alderfer, R. B.
Soil structure studies with synthetic conditioners.
Bull. Pa agric. Exp. Stat. **586,** 1954, pp. 46, bibl. 22, illus.

The influence of structure on yield of vegetable crops was studied on 6 field soils and 2 greenhouse soils. In soils with poor tilth, improvement in the structure of the whole 6-inch surface layer by synthetic conditioners was accompanied by an increase in production of tomatoes, peppers, lima beans, snap beans, carrots, table beets, turnips and tobacco. Improved structure of a 6 in. wide by 6 in. deep section of the row increased the yield of table beets, carrots, turnips, snap beans and lima beans. Yields of cucumbers, snap beans and turnips were increased by liquid application of soil conditioners over the row after seeding. In the two greenhouse soils investigated structural improvement did not affect tomato yield. [See also 3484, 3485.]

3911. Haworth, F., and Nelder, J. A.
The effect of "krilium" on the yield of certain vegetable crops. II.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1954, 1955, pp. 40-7.

Except in one experiment, the application of krilium again failed to increase the yield of peas, lettuce and celery [see *H.A.*, 24: 3776]. Why is not known. [See also 3484, 3485.]

3912. Heintze, K.
Untersuchungen über den Einfluss hoher Stickstoffdüngung auf die Bildung der einzelnen N—Fraktionen bei einigen Gemüsen. **(Studies on the effect of high N applications on the formation of individual N fractions in several vegetables.)** [English summary 13 lines.]
Landw. Forsch., 1955, **7**: 216-31, bibl. 108.

Increased dosages of complete (NPK) fertilizers resulted in an increase of total N in cabbage (three varieties), kohlrabi, onion and carrot. The potential content of pure protein-N, however, is strictly limited in certain plants, e.g. cabbage. Any N supplied in excess of this is stored in amide form. The part played in the human body by ingested amides is not yet sufficiently understood, hence judgement must be reserved on the nutritional value of generously fed vegetables. [From author's English summary.]—Bundesanst. f. Lebensmittelfrischhaltung, Karlsruhe.

3913. Bottini, O., and Lisanti, L.
Ricerche e considerazioni sull'irrigazione con acque salmastre praticata lungo il litorale barese. **(Views and studies on irrigation [of vegetable crops] with brackish water as practised on the Bari coast.)** [English summary ½ p.]
Ann. Sper. agrar., 1955, **9**: 401-36, bibl. 50, illus.

On the Bari coast horticultural crops, grown every second or third year on a given piece of ground, are irrigated with brackish well water, individual applications being abundant and frequent. Soil and water analyses are given. It is concluded that tomatoes tolerate up to 8 g. salt per l. water in a warm, dry climate when the water has a 5: 1 sodium-calcium ratio, when the soil is calcareous, permeable, well drained and receives abundant organic manure, and when individual applications are abundant and the intervals between them are short so that the soil remains constantly moist.—Ist. Chim. agrar. Univ. Bari.

3914. George, L. F.
The Maryland field conveyor.
Market Grs' J., 1955, **84** (7): 6-8, illus.

A report is given on the harvesting of vegetables with the help of field conveyors built at the University of Maryland. In tests with tomatoes, cucumbers, broccoli, cabbage and peppers, harvesting time was reduced by 15–50%. The machine straddles the rows which are being picked by hand, and the belt conveys the vegetables to baskets.—Dep. agric. Engng, Univ. Md.

3915. Hartman, J.
A possible objective method for the rapid estimation of flavors in vegetables.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 335-42, bibl. 11, illus.

A technique possibly capable of serving as the basis for rapid development of a practical and quick objective measure of flavour in vegetables is described. The apparatus is illustrated diagrammatically. Use is made of a sensitive element (a microelectrode) capable of reacting to volatile materials, thus simulating the action of the human olfactory receptors. Preliminary results are presented indicating that the technique is experimentally workable. Suggestions are made for its elaboration.—Cornell Univ., Ithaca, N.Y.

3916. Beal, J. M., Preston, W. H., Jr., and Mitchell, J. W.
Use of 2,3,5-triphenyl tetrazolium chloride to detect the presence of viruses in plants.
Plant Dis. Reptr, 1955, **39**: 558-60, bibl. 6.

The development of a technique for applying the tetrazolium colour test is described. In preliminary trials in 1954, in which clean and infected plants were compared, positive reactions were obtained with one or more virus diseases each of snap bean, tobacco, chrysanthemum, sugar beet and sweet corn.—Agric. Res. Serv., U.S. Dep. Agric., Beltsville, Md.

3917. Bortels, H.
Nassfäulen durch *Erwinia carotovora.* **(Wet rots caused by *Erwinia carotovora*.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 114-15, bibl. 2, illus.

Erwinia carotovora attacks many economic and ornamental crops, glasshouse plants being particularly susceptible. Control measures mentioned are preventive: maintaining optimum climatic conditions in the glasshouse; disinfection after dealing with infected plants; soil sterilization in extreme cases.

3918. Frost, S. W.
Cutworms of Pennsylvania.
Pepper, J. O.
Control of cutworms and armyworms.
Bull. Pa agric. Exp. Stat. **596,** 1955, pp. 28, bibl. 18, illus., and pp. 2.

The first and major part of the bulletin is devoted to descriptions of the many noctuid species found in Pennsylvania. The second part deals briefly with their control with sprays or dusts of chlordane, DDT and toxaphene and the preparation of poison baits.

3919. van Dinther, J. B. M.
De levenswijze van de veenmol en zijn bestrijding. **(Biology and control of mole crickets.)** [English summary ½ p.]
Surinaam. Landb., 1955, **3**: 72-7.

Food plants of *Scapteriscus didactylus* include tomatoes, lettuce and cabbage. In control experiments in rice, chlordane, aldrin and dieldrin were the most successful materials used.

3920. Smith, F. F., Giang, P., and Taylor, E. A.
Reduction of malathion residues on vegetables by washing.
J. econ. Ent., 1955, **48**: 209-10, bibl. 3.

At Beltsville malathion at 1·75 lb. active ingredient per acre was applied as dust, emulsifiable concentrate and wettable powder to beetroot, broccoli, kale, lettuce, okra, snap bean and tomato. Most of the samples were harvested about 1 hour after treatment, washed and extracted for chemical analysis. It was found that washing for 60 seconds reduced the residues below 1 p.p.m. on all treated vegetables except lettuce treated with the wettable powder spray and broccoli receiving either spray.

Asparagus.

3921. Brasher, E. P.
Effects of fertilizer practices, cover crops, and ridge culture on the yield of asparagus.
Bull. Del. agric. Exp. Stat. **311,** 1954, pp. 18, bibl. 22.

On a sandy loam in Delaware trials were carried out for 9 years to determine the effects of lime, fertilizer practices, chicken manure, cover crops and ridge culture on asparagus yield. Furrow application of 2,000 lb. of ground limestone per acre before planting was significantly inferior to broadcast application. Spring application of 800 lb. per acre of a 5: 10: 10 fertilizer resulted in significantly greater yields and heavier spears than higher rates. Climatic conditions affected the success of fertilizer applications. Split applications were superior in 4 out of 7 years, and on an average gave better yields and spear weight than single applications in spring or after harvest. "Over-the-row" fertilizer applications in a band 18 in. wide were more efficient than side or broadcast applications. Of four fertilizer ratios tested, a 1: 2: 3 ratio was the best, while a 1: 2: 2 ratio was the poorest. Side-dressings of 40 lb. N with or without 100 lb. potash in August gave lower yields than potash alone. Annual applications of poultry manure to established asparagus beds were detrimental, but applications before the first cutting season improved yields at the first harvest. Annual cover crops of buckwheat and soybeans when seeded about 4 weeks after the end of the cutting season significantly increased yield and spear size. The greatest yields and heaviest spears of the trials were produced by ridging the rows 6 in. high at the beginning of the cutting season. The average annual yield difference between ridge and level culture was 286 lb. per acre.

Brassicas.

(*See also* 3415, 3457, 3476, 3498q, 4065k, p, 4204.)

3922. Morgan, C. N.
Cauliflower varieties.
Qd agric. J., 1955, **80**: 147-50, illus.

White Queen, Russian 2A, Snowball and Phenomenal are considered suitable for commercial production in Queensland.

3923. Čereeva, S. N., and Gončarik, M. N.
The production of new forms in the cabbage variety Nomer Pervyĭ in the far north. [Russian.]
Agrobiologija, 1954, No. 6, pp. 62-9, bibl. 10, illus.

Under unusual weather conditions at Igarka, the variety gave rise to many abnormal forms, some of which resembled savoy cabbage or brussels sprouts.

3924. Sherrard, G. O.
The breeding of brussels sprouts at the Albert College [Dublin].
Sci. Hort., 1952-54, **11**: 124-7, illus.

Some results are given of breeding work on sprouts aimed at producing a medium-sized, solid, heavy sprout suitable for the Dublin market.

3925. Zeevaart, J. A. D.
Heterosis in brussels sprouts, especially with reference to cold resistance. [Dutch summary 6 lines.]
Euphytica, 1955, **4**: 127-32, bibl. 6, illus.

Plants obtained from inbreeding showed reduced vigour and yielded poor quality sprouts. The heterosis cross produced sprouts of a better quality than those from the parent varieties. A heterosis effect for cold resistance was also observed. The results are discussed and interpreted according to Jones' dominance hypothesis.—Lab. Tuinbouwpl., Wageningen.

3926. Kanasawa, K., and Kagawa, A.
On the differentiation of flower-buds in varieties of *B. juncea* Coss. and *B. cernua* Homsl. [Japanese, with English summary ½ p.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951, **13**: 100-5, bibl. 14, illus. [received 1955].

The varieties of Chinese and Japanese mustards studied were classified into 3 groups on the basis of the period elapsing between sowing and flower bud differentiation, viz. (1) 18 varieties, 20–28 days; (2) 10 varieties, 35–42 days; (3) 2 varieties, 42–49 days, and a third which had not begun to differentiate even at 75 days after sowing.

3927. Stoljarov, A. V.
Seed production of the cabbage variety Nomer Pervyĭ. [Russian.]
Sad i Ogorod, 1955, No. 6, pp. 16-18, illus.

In the Gorki region the early cabbage variety Nomer Pervyĭ [Number One] produces better seed plants from summer, early June, sowing than from spring sowing. By a newly developed method spring-sown plants were used for both consumption and seed. The heads of selected plants were carefully harvested in July and from the remaining stumps side shoots developing into small heads arose, 2–3 of which were retained. These plants, dug and stored during the winter and planted out in the following spring by the usual method, produced a good yield of about the same quality seed as the summer-sown plants.

3928. Metcalf, H. N.
Effect of leaf and terminal bud removal on yield of brussels sprouts.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 322-6, bibl. 8.

In a three-year experiment at Bozeman, Montana, highest yields of Catskill brussels sprouts were obtained by removing the terminal bud during the first half of August, and allowing the lower leaves to remain on the plants until harvest. In a two-year time of planting trial at the same location, highest yields were obtained by sowing the seed on 10 April. [Author's summary.]

3929. Synge, R. L. M., and Wood, J. C.
A new free amino acid in cabbage.
From abstr. in *Biochem. J.*, 1955, **60** (2): xv-xvi, bibl. 7.

The new amino acid is considered to be one of diastereoisomeric forms of L-*S*-methylcysteine sulphoxide. It seems to account for a substantial proportion of the organic sulphur in cabbage.

3930. Lüders, R.
Beziehungen zwischen Stickstoff- oder NPK-Düngung und dem Phosphorsäure- und Schwermetallgehalt von Pflanzen. **(The relationship between nitrogen or NPK manuring and the phosphoric acid and heavy metal content of plants.)**
Z. PflErnähr. Düng., 1955, **68**: 56-65, bibl. 12.

The effect of increasing N and NPK manuring on yield and mineral content was studied with cauliflower, ryegrass and summer rye. Cauliflowers at the marketing stage were analysed. P_2O_5 content was hardly affected by manuring. In the leaves Fe, Cu and Zn contents increased with increased N applications, and the Zn content of the head also increased. Yields from plots receiving mineral NPK manuring were 77% higher than those from plots manured with peat plus PK.—Lab. Erdbereitung, Hamburg-Blankenese.

3931. Agarwala, S. C., and Hewitt, E. J.
Molybdenum as a plant nutrient. V. The interrelationships of molybdenum and nitrate supply in the concentration of sugars, nitrate and organic nitrogen in cauliflower plants grown in sand culture.
J. hort. Sci., 1955, **30**: 151-62, bibl. 13.

Cauliflower plants were grown in sand culture with high and low levels of nitrate and 8 levels of Mo, ranging from 0·000005 to 19·2 p.p.m. Concentrations of total and reducing sugars in leaves and stems of mature plants increased significantly with increased Mo supply up to about 0·05 p.p.m. Mo and then usually decreased. There were further increases at the highest Mo levels. Sucrose showed smaller but similar changes. High nitrate supply resulted in lower total and reducing sugar concentrations in leaves after 60 days' growth than low nitrate supply, and in a lower total sugar concentration in stems of mature plants. Nitrate N concentrations decreased sharply with small increases in Mo level up to 0·0005 p.p.m. Mo and showed little change at higher levels. Organic N concentration increased with Mo supply. The maxima usually occurred at Mo levels similar to, or slightly higher than, those beyond which there were only slight or negligible decreases in nitrate concentration. These levels were usually lower than those associated with maximum sugar contents. It is considered that the changes in sugar concentrations do not directly account for the effects of Mo on ascorbic acid content [see *H.A.*, 25: 537]. It is tentatively suggested that the low sugar concentrations found at 0·000005–0·0005 p.p.m. Mo, especially in the high nitrate series, may be related to or parallel to changes in constituents of the middle lamella, previously noted to appear abnormal in localized areas of leaves affected by whiptail [see *H.A.*, 25: 536].—Long Ashton Res. Stat.

3932. Agarwala, S. C., and Hewitt, E. J.
Molybdenum as a plant nutrient. VI. Effects of molybdenum supply on the growth and composition of cauliflower plants given different sources of nitrogen supply in sand culture.
J. hort. Sci., 1955, **30**: 163-80, bibl. 15, illus.

Cauliflower plants were grown in sand culture with N from various sources at deficiency, normal and excess levels of Mo. Primary Mo deficiency symptoms of mottling, wilting and scorching occurred consistently but only in the nitrate treatments. They are regarded as the result of a nitrate nutrition-Mo deficiency interaction. Whiptail symptoms indicating Mo deficiency were produced at low Mo levels irrespective of the N source. They are regarded as evidence of some role of Mo additional to that in nitrate reduction. Yields were decreased by Mo deficiency irrespective of N source. Mo requirement was greatest with nitrate or ammonium nitrate, and least with ammonium and nitrite compounds. Addition of citrate or malate apparently accentuated Mo deficiency symptoms with nitrate or nitrite but not with urea or ammonium compounds. Effects of Mo excess differed with different sources of N, being slight with nitrate and severe with ammonium sulphate or urea. Data are also presented on the effect of N source and Mo supply on leaf contents of Mo, chlorophyll, ascorbic acid, sugars and nitrates. The effects of Mo deficiency on growth and whiptail production and on ascorbic acid and sugar contents were independent of those on chlorophyll content or nitrate accumulation. The effects of Mo on ascorbic acid content were apparently independent of those on sugar content. It is concluded that Mo is an essential element for cauliflower, regardless of N source, and that it has a multiple role in the metabolism of cauliflower in addition to that in nitrate reduction.—Long Ashton Res. Stat.

3933. Broadbent, L., and Moss, N.
Cauliflower mosaic virus: protection of seedbed experiment.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 30-3.

Combined sowing of a barley barrier crop and a cauliflower seed-bed was accomplished with a commercial seed drill. The incidence of cauliflower mosaic in protected seed-beds was about one-fifth of that in unprotected seed-beds.

3934. Ryžkova, A. S.
Increasing the resistance of cabbage seedlings to vascular bacteriosis. [Russian.]
Agrobiologija, 1954, No. 6, pp. 144-6, bibl. 8.

Studies were made on *Xanthomonas campestris* resistance of cabbage seedlings grown in nutrient solutions. By altering the N: P: K ratios in the solutions resistance was increased or reduced. In general, high K and low N appeared to induce resistance, though certain other combinations also prevented the development of black rot following artificial infection.

3935. van Dinther, J. B. M.
De bestrijding van de bladluis *Lipaphis erysimi* Kltb. (**Control of the leaf aphid *Lipaphis erysimi*.**) [English summary 14 lines.]
Surinaam. Landb., 1955, **3**: 217-20.

Lipaphis erysimi occurs throughout the year in Surinam on various *Brassica* spp. In laboratory experiments parathion gave 100%, and lindane and DDT over 90% kill. Farmers are recommended to use either DDT as an oil spray or lindane as an oil spray or wettable powder.

3936. Ankersmit, G. W.
Over het verband tussen de aantasting door de koolzaadgalmug, *Dasyneura brassicae* Winn. (Diptera, Itonididae) en de koolzaadsnuitkever, *Ceuthorrhynchus assimilis* Payk. (Coleoptera, Curculionidae). (**The relationship between attacks by cabbage seed pod midge and the seed pod weevil.**) [English summary ½ p.]
Tijdschr. PlZiekt., 1955, **61**: 93-7, bibl. 5, illus.

Cabbage seed midges both when caged and in the field were observed to seek for damaged pods in which to lay their eggs. The cabbage seed weevil is the chief contributor to the number of damaged pods, but its economic control would have only a limited indirect effect on infestation by the first midge flight.

Celery.

3937. Mazoyer, M.
Rôle du sodium en agriculture. (**The role of sodium in agriculture.**)
Reprinted from *Industr. chim. Paris*, 1954, pp. 11, bibl. 27.

Celery is among the crops discussed in this review which respond to sodium applications.

3938. Cox, R. S.
Compatibility between a streptomycin-terramycin formulation and copper in the control of bacterial blight of celery.
Plant Dis. Reptr, 1955, **39**: 484-6, bibl. 2.

Weekly spray applications of Agrimycin-100 (streptomycin+terramycin) or of a neutral copper (45% C-O-C-S-) gave effective control of bacterial blight caused by *Pseudomonas apii*. In a dosage range of 100 to 1,000 p.p.m. Agrimycin increased in effectiveness up to 400 p.p.m. Agrimycin and copper combined gave better control than either used alone.—Everglades Exp. Stat., Univ. Fla, Belle Glade.

Cucurbits.

(*See also* 4031, 4065d, q, x, 4066n, 4102.)

3939. Anon.
Four cucumber varieties for brining.
Agric. Res. Wash., 1955, **3** (12): 16.

Model, Packer, Earliest of All and Ohio MR-17 were the best among 19 varieties and strains of cucumber tested at Raleigh, North Carolina.

3940. Tkačenko, N. N.
New early and productive hybrid cucumbers for the south. [Russian.]
Sad i Ogorod, 1955, No. 6, pp. 12-13, illus.

A description is given of a new variety and 2 hybrid cucumbers. Seed of the hybrids 220 and 221 is obtained by insect cross-pollination of female plants of the variety Posrednik 97Ž with the varieties Nežinskie and 96-1 respectively.

3941. Miheljson, O. A.
Cucurbits and vegetables in eastern Kara-Kum. [Russian.]
Sad i Ogorod, 1955, No. 6, pp. 22-4.

A brief description is given of the methods developed at Repetek in the Kara-Kum desert, Turkmenia, for growing certain varieties of marrow, melon, watermelon, cucumber, onion, carrot, radish, parsley and dill. Watermelons were successfully grown on the roots of the weed [*Alhagi camelrum*] as is the practice in western Turkmenia. The method consists of planting imbibed watermelon seed into the root collar of alhagi plants, the aerial parts of which have been cut off 2–3 cm. below the soil surface; the whole is then covered with sand.

3942. Zink, F. W.
Evaluation of plastic hot caps on muskmelons.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 315-21, bibl. 2.

Five types of rigid, semi-permanent plastic covers were compared in California with the standard glassine paper hot caps for forcing melons. Percentage emergence, rate of emergence, rate of maturity and total yield were no better under the plastic caps than under the glassine caps. Frost protection was not increased and air temperatures reached a higher maximum and a lower minimum under the plastic covers. The cost of rigid plastic covers is higher than that of glassine sheets. Although this cost can be pro-rated over several years and labour costs are reduced, the total expense is not reduced enough to permit rigid plastic covers to compete economically with glassine sheets.—Univ. Calif., Davis.

3943. Banerjee, S. N., and Chaterjee, B. K.
Studies on the phytotoxic action of BHC & DDT on the common cucurbitaceous plants in West Bengal.
Proc. Indian Acad. Sci., Sect. B, 1955, **41**: 227-39, bibl. 8.

In field and greenhouse experiments 0·1% DDT spray caused no injury to any of the 9 cucurbitaceous plants tested, and 4% and 5% BHC dusts injured only *Lagenaria vulgaris*, which showed leaf burn. In laboratory tests on *Epilachna* spp., one of the two chief genera of cucurbitaceous pests in West Bengal, 0·1% DDT caused 70% and 5% BHC 100% mortality after 54 hours.—State agric. Res. Inst., Tollygunge, Calcutta.

Legumes.

(*See also* 3416, 3450, 3451, 3455, 3458, 3467, 3479, 3498q, r, t, z, 4035, 4065h, j, r, u, 4066c, f, p, 4462, 4471, 4479.)

3944. Orman, A. C.
Growing beans in New South Wales.
Agric. Gaz. N.S.W., 1955, **66**: 128-33, 184-7, 223, illus.

Cultural recommendations are given for growing dwarf and climbing French beans, and for seed production in New South Wales. In coastal areas many fruit and banana growers intercrop their young plantations with beans. Recently inland growers have been using irrigation in bean production.

3945. Stout, G. J.
New pole bean resists rust.
Mkt Grs' J., 1955, **84** (6): 26, illus.

Florigreen, a new runner bean developed by the Florida Agricultural Experiment Station, is resistant to bean rust and there are indications that it is immune. It is the result of a cross between F-M 191 and Pinto No. 5. The pods are long, straight, dark green and essentially stringless when harvested at the right stage. It is 3–5 days earlier than F-M 191. The variety is also resistant to the common and southern bean mosaics.

3946. Joubert, T. G. la G., and Vermeulen, W. J.
A new pole-bean variety "Green Savage".
Fmg S. Afr., 1955, **30**: 297-8, bibl. 2, illus.

Green Savage was developed from a cross between Savage Wonder and Canfreezer. It is fairly rust-resistant, gives high yields and is of good canning quality.

3947. Kiss, Á.
Ernyősborsó keresztezési kísérletek. **(Experiments on crossing umbellate peas.)** [English, Russian and German summaries 1½ pp. each.]
Növénytermelés, 1955, **4**: 3-24, bibl. 38, illus.

The *fasciata* type of pea, characterized by a short, compact inflorescence, is sometimes classified as an independent species, *Pisum umbellatum*, but more recent work has shown that it arose by mutation [see also *H.A.*, 24: 3842]. The experiments described here were an attempt to transmit to commercial pea varieties such desirable characteristics of the *fasciata* type as uniform maturity and strength of vine to facilitate mechanical harvesting.

3948. PESOLA, V. A.
Protein content of field pea seeds as a varietal character.
Reprinted from *Suom. Maataloust. Seur. Julk*, 1955, **83**: 125-32, bibl. 16.

Extensive trials at the Agricultural Research Centre, Jokioinen, with field pea varieties, including some intended for human consumption, showed that the crude protein content of the seed is a varietal character dependent on polymeric genes. It can therefore be increased by breeding.

3949. INOUE, Y., AND SUZUKI, Y.
Studies on flower bud differentiation, flowering and fruiting of peas, *Pisum sativum* L. II. On the fertility of pollen.
Ibid. III. On the relation between the position of ovules in the pod and fertility.
[Japanese, with English summaries ½ p. and 6 lines.]
J. hort. Ass. Japan, 1955, **23**: 221-4, bibl. 9, illus., and 225-7.

Pollen germination and tube elongation (1) increased considerably with increases in the period on germinating medium from 1 to 6 hours but increased only slightly with increases above 8 hours; (2) were not significantly affected by temperatures between 10° and 30° C., though germination was much reduced at 0° and 40° C.; (3) were greater in darkness than light; (4) were little affected by time of collection between 8 a.m. and 5 p.m. Germination was nil 4 days before flowering, highest on the day before flowering (i.e. the day of anther dehiscence) and rather poor on the day of flowering.

Ovules nearest the centre of the pod were the most fertile, basal ones the least so and those at the apical end intermediate in fertility. Ovule fertility averaged 60% in the Usui variety.

3950. MASEFIELD, G. B.
Conditions affecting the nodulation of leguminous crops in the field.
Emp. J. exp. Agric., 1955, **23**: 17-24, bibl. 10.

Field experiments in England provided no evidence that the nodulation of field beans (*Vicia faba*), dwarf beans (*Phaseolus vulgaris*) or peas is inhibited by the proximity of another plant of the same species or a different species (maize, oats, barley, foxtail millet). Attempts were made through the use of insecticides to prevent damage to the nodules of field beans and peas by larvae of *Sitona lineata* Linn. DDT and dieldrin achieved only partial control of the larvae, and there was no conclusive evidence that the yield of seed was thereby increased. In agreement with previous findings for other legumes [see *H.A.*, 23: 742], positive correlations between nodule weight and plant weight were found in crops of *Dolichos lablab* and *Phaseolus trilobus* in the Sudan. However, similar correlations between the mean figures for crops in different places or seasons, or under different treatments, were found more rarely. It is suggested that environmental factors often affect nodule weight and plant weight differently. The life-span of nodules normally continues until the host plant passes the peak of flowering. With short-day varieties of *Dolichos lablab* in the northern Sudan, however, the flowering of early sown crops may be delayed until the nodules are already decayed; with this species nodules also appear to be formed exceptionally early. [Author's summary.]—Dep. Agric., Univ. Oxford.

3951. HYRE, R. A.
Effect of lima bean cover on temperature and relative humidity.
Plant Dis. Reptr, 1955, **39**: 473-4, bibl. 2.

As part of an investigation to determine data needed for forecasting outbreaks of downy mildew (*Phytophthora phaseoli*) on lima beans, mean air temperatures were recorded in four positions in, or near to, bush lima bean plants, namely, (*a*) among plants, (*b*) between rows, (*c*) in an instrument shelter between two rows, and (*d*) 5 ft. above ground over a row. Temperature differences between the positions amounted to less than 1½° F. By contrast, mean R.H. was about 10% higher among plants than at 5 ft. above ground over a row.—Univ. Del., Newark.

3952. JANSSON, S. L., AND TORSTENSSON, G.
Kvävegödslingens inverkan på ärtskördens storlek och sammansättning. **(Effect of nitrogen manuring on yield and composition of pea harvest products.)** [German summary 1 p.]
J. roy. Swedish Acad. Agric., 1955, **94**: 210-20, bibl. 20.

In 5 years of pea trials with the variety Torsdags II the effect of N manuring in combination with various rates of K and lime application was studied. Nitrogen fixation was sufficient for plants receiving no N fertilizer. Applications of ammonium nitrate lowered N fixation so that the total N content of the harvested plants was about equal to that of plants receiving no fertilizer. Total haulm harvest was increased by 10% with N manuring, but the N content and 1,000-seed weight of the peas was reduced. N manuring caused increased Ca uptake, which was apparent as an increase in the Ca content of the haulm. K uptake was hardly affected by N manuring. Application of K had no apparent effect on the total N content of the harvested plants, but it increased the harvest. Liming increased the total N content of the harvested products.

3953. PORTER, L. K., AND THORNE, D. W.
Interrelation of carbon dioxide and bicarbonate ions in causing plant chlorosis.
Soil Sci., 1955, **79**: 373-82, bibl. 16.

Nutrient solution studies were conducted to determine the effects of CO_2, bicarbonate ions and pH on the chlorosis of bean and tomato plants. Air plus 10 me./l. sodium bicarbonate resulted in decreased chlorophyll content and growth in comparison with air plus 0·3 me./l. of sodium bicarbonate. At constant pH but with increased concentrations of sodium bicarbonate and carbon dioxide intensity of chlorosis increased and growth decreased. Increasing concentrations of sodium bicarbonate in cultures with constant pH resulted in increasing concentrations of Fe in leaf and stem tissues of tomatoes; beans showed a similar tendency. The results indicated that the bicarbonate ion was a direct causative factor in chlorosis in many plants.—Utah State Agric. Coll.

3954. Sharp, W. O., and Blunt, C. F.
Control of marsh spot in peas.
Fmr & Stk-Breed., 1955, **69** (3421): 53, 55, illus.

A survey of marrowfat peas growing on Romney Marsh, Kent, in 1954 showed the majority to be suffering from marsh spot and confirmed that this disorder is associated with Mn deficiency. Preliminary observations on spraying with 0·5% manganese sulphate suggest that, as proved to be the case in Holland, two applications may be needed in some cases, the best times for the applications being at mid-flowering (about 18 days after the first flowers appear) and again 7 days later. The possibilities and risks of combining Mn sprays with insecticides and herbicides are discussed.—N.A.A.S., Wye.

3955. Gray, R. A.
Activity of an antiviral agent from *Nocardia* on two viruses in intact plants.
Phytopathology, 1955, **45**: 281-5, bibl. 9.

Leaf spray applications at a concentration of 1,000 p.p.m. of partially purified noformicin, an antibiotic produced by a species of *Nocardia*, markedly inhibited both the production of local lesions and systemic infections caused by southern bean mosaic virus and by tobacco mosaic virus in intact plants. Sprays containing 125 p.p.m. of crystalline norformicin were equally effective. The antiviral activity of this antibiotic was similar to, but not so lasting as, that of thiouracil on the 2 viruses in bean and tobacco plants. Application of the antibiotic to roots of Pinto bean plants growing in sand reduced the number of local lesions produced in the primary leaves. Treatment of the viruses *in vitro* with the partially purified antibiotic at 1,000 p.p.m. and the pure noformicin hydrochloride at 250 p.p.m. for 24 hours at 28° C. or for 81 hours at 6° C. did not reduce the activity of either virus. Virus infections were inhibited when the sprays of the antibiotic were applied to the leaves starting 1 hour or 1 day after inoculation, as well as when the sprays were applied for several days before inoculation. Evidence was obtained that the antibiotic was translocated both from the base of a bean leaf to the tip and in the reverse direction.—Merck & Co., Inc., Rahway, N.J.

3956. Anon.
Antibiotics have a farm future.
Agric. Res. Wash., 1955, **3** (10): 7.

In addition to listing the better known experimental uses of antibiotics against bacterial and some fungus diseases [see *H.A.*, 25: 388], it is noted that agrimycin prevented the development of tobacco necrosis and tobacco ring-spot symptoms on cowpea leaves and that an experimental antibiotic provided 70 to 90% control of tobacco mosaic virus.

3957. Klinkowski, M., Köhler, H., and Schrödter, H.
Möglichkeiten der Desinfektion fettfleckenkranken Bohnensaatgutes durch Antibiotika unter Berücksichtigung des Einflusses meteorologischer Faktoren. **(The disinfection of bean seed with antibiotics for halo blight control, with special reference to the influence of meteorological factors.)**
Phytopath. Z., 1955, **23**: 345-80, bibl. 47, illus.

The treatment of naturally infected bean seed with culture filtrates of *Penicillium chrysogenum* and *Streptomyces griseus* greatly reduced the incidence of halo blight in the glasshouse and in the field. Varietal, morphological and histological characteristics of the seed did not affect the penetration of the antibiotics. In two years' field trials yield increases of up to 250% were recorded as a result of seed disinfection. A lapse of 5½ months between treatment and time of sowing did not reduce the action of the antibiotics, which remained uniformly distributed in the seed. In sand culture the filtrates were absorbed by the roots in effective concentrations without causing any plant injury. The influence of meteorological factors, especially soil temperature, on the success of the treatment under field conditions is discussed in detail. Further studies are necessary before these preliminary results can be converted into practical recommendations.—Inst. f. Phytopath., Aschersleben and Agrarmet. Forschungsstat., Aschersleben.

3958. Gray, R. A.
Increasing the effectiveness of streptomycin against the common blight of beans with glycerin.
Plant Dis. Reptr, 1955, **39**: 567-8, bibl. 4.

The addition of glycerin to streptomycin sprays caused a marked increase in the effectiveness of the antibiotic against the common bacterial blight (*Xanthomonas phaseoli*) of Pinto beans in greenhouse tests. This increase in effectiveness caused by glycerin was correlated with an increase in absorption of streptomycin by the leaves. A spray containing 50 p.p.m. streptomycin sulfate and 1% glycerin was much better than a spray containing 200 p.p.m. streptomycin alone. [Author's summary.]—Res. Lab., chem. Div., Merck & Co., Rahway, N.J.

3959. Jacks, H., and Brien, R. M.
Screening tests with fungicides for control of French-bean rust (*Uromyces appendiculatus* (Pers.) Unger).
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 62-7, bibl. 3.

Thirty-seven fungicides were tested in the glasshouse for control of *Uromyces appendiculatus*. Effective compounds were lime-sulphur plus colloidal sulphur [see also *H.A.*, 25: 1707], colloidal sulphur, fine wettable sulphur, zineb, ferbam, maneb, thiram, ziram, captan, dichlone, chloranil and nitrobenzene. [From authors' summary.]—D.S.I.R., Auckland.

3960. Johnson, H. G.
Investigations on the control of root rot of canning peas.
Diss. Abstr., 1954, **14**: 1124, being *Publ.* 8457 of 97 pp.

Aphanomyces euteiches was the most important cause of root rot in canning peas in Minnesota. Root rot was reduced by using tile drainage, commercial nitrogen fertilizer, well-rotted organic matter, and rye green manure. In preliminary experiments, mixing the fumigant OS-1199 with the soil gave excellent control of root rot and greatly increased plant growth. Some foreign introductions of *Pisum sativum* were found to be more tolerant to root rot than commercial varieties.

3961. Oostenbrink, M.
Een inoculatieproef met het erwtencystenaaltje, *Heterodera goettingiana* Liebscher. **(An inoculation trial with the pea root nematode.)** [English summary ½ p.]
Tijdschr. PlZiekt., 1955, **61**: 65-8.

Four levels of nematode larvae populations were inoculated in nematode-free soil, followed by pea sowings. The peas showed a gradual yellowing and growth retardation comparable with symptoms of the so-called St. Jans disease, the degree of damage increasing with inoculation level. These experiments prove, probably for the first time, the primary role of this nematode as a plant pathogen.

3962. Bockmann, H.
Vorbeugende Massnahmen gegen die Erbsenmüdigkeit. **(Prophylactic measures against soil sickness in peas.)**
Reprinted from *Industr. Obst- u. Gemüseverwert.*, 1955, No. 12, pp. 3, bibl. 7.

"Tiredness" in peas is caused by a variety of factors the most important of which are nematodes and pathogenic soil fungi. Its symptoms are sudden cessation of growth, reduced development of root nodules, root rot, wilting and yellowing of leaves. At present crop rotation with an interval of several years between one pea crop and the next is the only method known to control this important malady. Applications of stable manure did not provide a cure, but soil structure was shown to affect the severity of the disease. A study is being made of other aspects of the trouble, with special reference to differences in varietal resistance.—Biol. Bundesanst. Kiel-Kitzeberg.

3963. Togashi, S., and Parker, R. L.
Control of the two-spotted spider mite on bush beans.
J. econ. Ent., 1955, **48**: 177-9, bibl. 6.

Of acaricides applied for the control of *Tetranychus bimaculatus* on 3 varieties of bean, 50% ovotran and 15% aramite, each at 2 lb. w.p. in 100 gal., appeared the most effective.—Kansas St. Coll.

3964. (Way, M. J.)
Control of bean aphid (*Aphis fabae* Scop.).
A.R. Rothamsted exp. Stat. 1954, pp. 114-16.

In a comparison of 8 different insecticides, 0·025% demeton and 0·05% metasystox gave the most effective control of the aphid, though all materials used gave useful control. A DDT spray suspension had relatively small effect on *Aphis fabae*, but was highly toxic to *Acyrthosiphum pisum*, *Sitona lineatus* and *Meligethes* sp. Demeton applications resulted in an increased yield of both autumn and spring beans.

3965. Davich, T. B., and Apple, J. W.
Schradan content in field grown peas in relation to pea aphid control.
J. econ. Ent., 1955, **48**: 180-1, bibl. 12.

Extremely high initial control of the pea aphid was found to occur following foliage applications of schradan at rates of 4 and 8 lb. per acre. Chemical analyses 2 days after treatment indicated schradan residues of 109·2 and 266·8 p.p.m. respectively. Fourteen days after treatment an increase in aphid numbers signified a loss of toxicity even though 19·8 p.p.m. of schradan was detected in plants treated with the 8-lb. rate. Shelled peas harvested 21 days after treatment were found to contain 3·2 and 6·5 p.p.m. of schradan, respectively. No schradan residue was detected in shelled peas from plants receiving 1 lb. of toxicant per acre, although this dosage did produce 90% aphid control 9 days after treatment when 31·5 p.p.m. of schradan was found to be present. A ¼-lb. dosage resulted in 19·9 p.p.m. of schradan 2 days after treatment but this level of toxicant was inadequate for satisfactory aphid control. [Authors' summary.]—Univ. Wisc.

3966. Apple, J. W., and Martin, R.
Pea aphid control with demeton in relation to pea plant maturity.
J. econ. Ent., 1955, **48**: 193-5, bibl. 7.

Demeton was applied for pea aphid control on canning peas at 1, 2, 4 and 8 oz. per acre to plants with small pods, at first bloom and at the 10- and 3-node stages respectively. The 1 oz. rate suppressed the pea aphid satisfactorily when the interval before harvest was no greater than 8 days. Peas treated with the 2 oz. rate at the beginning of blossoming were protected from aphids for at least 10 days. Rates of 4 and 8 oz. on peas at the 10- and 3-node stages, respectively, gave very good initial protection, but 18 days later the aphids showed evidence of survival. Demeton residues in canned and frozen peas following the treatments at 4 stages of growth amounted to less than 0·3 p.p.m.—Univ. Wisc.

3967. Elmore, J. C.
The nature of lygus bug injury to lima beans.
J. econ. Ent., 1955, **48**: 148-51, bibl. 16, illus.

Lygus bugs, *Lygus hesperus* and to a lesser extent *L. elisus*, oviposit in and feed upon the main stems of small bean plants and on the tender growth terminals. Stems, fruiting spikes and young pods are attacked, but not blossoms or blossom buds. Extensive infestation can, however, cause shedding of blossom buds and young pods, with consequent crop loss.

3968. (Needham, P. H., and Way, M. J.)
Control of pea weevil (*Sitona lineatus* L.).
A.R. Rothamsted exp. Stat. 1954, pp. 116-18.

Seed dressings of BHC, demeton and dieldrin were applied to pea seed. Subsequent counts of feeding damage showed no control of adult weevils, and root nodule damage by the larvae was almost 100% in all plots.

3969. Ilić, B.
Suzbijanje graškovog žižka u prirodi. **(Control of *Bruchus pisorum* L. in the field.)** [English summary 1¼ pp.]
Zasht. Bilja, 1955, No. 29, pp. 75-92, bibl. 6.

Field trials at various places in Yugoslavia showed that pea weevil could be successfully controlled with BHC and DDT preparations provided they were applied early.

3970. Zaring, P. V., and Nikiforov, A. M.
Control of pea weevil. [Russian.]
Zemledelie, 1955, **3** (3): 109-11, illus.

For the control of pea weevil in the field 2 dust applications, at 8–10 days' interval, of either 10–12 kg. BHC or 15 kg. DDT per ha. have given good results. Aerosol treatments with 400 g. technical BHC in 10 kg. diesel oil per ha. applied from aeroplanes are also stated to be successful. Heavily infested pea seed should be fumigated with carbon disulphide, chloropicrin or dichlorethane immediately after threshing, or, when not for consumption, with BHC or naphthalene.

3971. Lowig, E.
Versuche und Beobachtungen zur Lebensweise des Speisebohnenkäfers. **(Research and observations on life history of the American seed weevil.)**
Saatgut-Wirtsch., 1955, **7**: 134-7, 166-8, bibl. 2, illus.

Heat treatment at 50° C. of bean seed infested with *Acanthoscelides obtectus* gave promising results, although the optimum time has not yet been determined. Such treatment for 16 hours did not affect the viability of beans and peas.

3972. Maebara, H.
On the number of entrance holes on the broad bean bored by the broad bean weevil. [Japanese, with English summary ¾ p.]
Bull. Fac. Agric. Kagoshima Univ., 1954, **3**: 28-33, bibl. 3.

Factors investigated were (1) the relationship between the number of beans bearing entrance holes of *Bruchus rufimanus* and the average number of holes per bean on the one hand and date of sowing on the other, (2) the relationship between the number of beans containing live weevils and those bearing entrance holes in mid-July, (3) the relationship between the number of entrance holes per bean and the height of the pod above ground, and (4) the frequency distribution of entrance holes on beans.

3973. Hirota, K., and Takeuchi, T.
Studies on supplements of pesticides. VIII. Effects of polyethylenoxy *p* nonylphenolic ethers on insecticides. [Japanese, with English summary ¼ p.]
Bull. Inst. Insect Control Kyoto, 1955, **20** (1): 1-4, bibl. 6.

A study was made on the effect of the surfactant on the efficacy of allethrin and DDT against the bean weevil *Callosobruchus chinensis*.

3974. Wene, G. P., Otey, G. W., and Griffiths, F. P.
Effect of benzene hexachloride and lindane on the flavor of purple hull peas.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 390-2, bibl. 8.

Use of lindane as an insecticidal dust on fields of purple hull peas [*Vigna sinensis*] did not result in an objectionable flavor carry-over into processed peas. Processed peas from plots having both single and triple applications of commercial BHC had a detectable off flavor. [Authors' conclusions.]—Texas agric. Exp. Stat., Weslaco.

3975. Shewfelt, A. L., Brown, D. R., and Troop, K. D.
Estimation of optimal harvest date of peas for canning and freezing.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 34.

From tests on 9 varieties of peas harvested at 3 different stages of maturity the optimal harvest date for each variety for canning and freezing was estimated, and also the yield at optimal harvest date.—Canada Dept Agric., Morden.

Mushrooms.

(*See also* 4065s, t, 4465, 4473.)

3976. van den Muijzenberg, E. W. B.
De betekenis van de champignonteelt. **(The importance of mushroom growing.)** [English summary 8 lines.]
Meded. Dir. Tuinb., 1955, **18**: 259-65, bibl. 13.

The author discusses world mushroom production and that in the Netherlands. Production costs in England and the Netherlands are compared. It is concluded that the best estimate of production is yield in kgs per cubic metre of house space per year. [See also *H.A.*, 24: 2723.]

3977. de Kleermaeker, E.
De champignonteelt in grotten en huizen in Nederland. **(Mushroom growing in caves and houses in the Netherlands.)** [English summary 5 lines.]
Meded. Dir. Tuinb., 1955, **18**: 417-23, illus.

In South Limburg mushrooms are grown in caves. Heating systems for mushroom houses are discussed, When one room is used, a hot-air stove is recommended, while central heating with air heaters is preferable for more than one room.

3978. van den Muijzenberg, E. W. B.
Enige bijzonderheden over champignonteelt in Zwitserland en Frankrijk, speciaal over de snelle broeimethode. **(Mushroom growing in Switzerland and France, with special reference to the short composting method.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 483-92, bibl. 8, illus.

The process of short composting lasts for 10 to 11 weeks, during which harvesting takes place for 6 or 7 weeks.

3979. Roland, J. F., Jr., and Weiner, B. A.
Bio-oxygenation of progesterone by mushrooms.
Science, 1955, **121**: 803-4, bibl. 7.

Several basidiomycete species were cultured under submerged fermentation conditions and their ability to form hydroxyl functions on various steroids and at differing C positions of these molecules was studied. The resultant data showed that the fungi tested could readily perform oxygenation and other biomodifications of steroids.—Res. Div., Armour and Co., Chicago.

Onions and related crops.

(*See also* 3472, 3867-3869, 4003, 4065c, e, k, l, y, 4066b.)

3980. Bouhelier, R.
Études sur les oignons. **(Investigations on onions.)**
(*Mimeo. Publ.*) *Serv. Hort. Rabat* **17,** 1955, pp. 47.
Études sur les oignons au Maroc. **(Investigations on onions in Morocco.)**
Terre maroc., 1955, **29**: 256-9.

An account is given of investigations made in 1950/54 on the summer production of onions in Morocco. Information is given on cultural and experimental methods, varietal studies, raising Mulhouse onions from sets [see also *H.A.*, 25: 1730] and the storage qualities and dry matter content of the varieties studied.

The second paper summarizes the same work.

3981. Erickson, H. T., and Gabelman, W. H.
Potential value of inbreds and F_1 hybrid onions for seed production.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 393-8, bibl. 5.

F_1 hybrid onions produced 91% more seed than inbred plants and a higher proportion of it was of excellent quality. About half of the increase was associated with an increased number of seed stalks on the hybrid plants, which was probably a function of bulb size. The remainder was due to increased seed production per head, probably an expression of hybrid vigour. Certain inbreds should be desirable seed parents provided they do not suffer excessive loss of vigour with inbreeding. Other valuable but less vigorous inbreds could probably be utilized in 3-way crosses. Most experimental 3-way hybrids have failed to show adequate uniformity but there have been notable exceptions. Field data indicated that the heavier seed of 3-way hybrids and other multiple crosses is of practical concern to the onion grower as well as to the seed producer.—Univ. Wisconsin, Madison.

3982. Posjavin, A. T.
A high yield of onion seeds. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 20-2.

The village of Bessonovka in the Penza province is an important centre of onion production. The seed of the Bessenovka onion is produced over 3 seasons. Presoaked seed is sown early in the spring at the rate of 50 kg. per ha. The sets harvested in August are dried gradually at temperatures up to 35–40° C. for 10–20 days, are then stored at alternating temperatures of 18–20, −2 and 20–25° C., and 2 weeks before planting are treated at 30–37° C. Planting out in early spring at 600 kg. per ha. is followed by fertilization, soil cultivation and harvest in August. The mother plants are dried at 35–40° C. and then stored at 4–6° C. The best bulbs of 4–5 cm. diameter are planted out very early to a depth of not less than 6–8 cm. at the rate of 85–90 centners per ha., fertilization and soil cultivation follow and when the crop is in flower beehives are placed around the fields to improve pollination. The seed is harvested towards the end of August. Yields have increased from 4·3 centners per ha. in 1951 to 7·6 centners in 1954.

3983. Moll, R. H.
Receptivity of the individual onion flower and some factors affecting its duration.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 399-404, bibl. 7.

Experiments on the duration of receptivity of individual onion flowers of several male-sterile lines for seed production were conducted during 1951 and 1952. The results showed that little or no loss of receptivity occurs during the first 3 days the flowers are open. Receptivity decreased gradually after the flowers had been open for 3 days under field conditions and for 5 days under laboratory conditions. Receptivity ceased entirely after the flowers had been open for 6 or 7 days. A prediction curve is presented showing the relationship between seed set and age of individual flowers. Small differences in the flowering dates of 2 desirable parents might be largely overcome by increasing the proportion of pollen rows in the seed field to give a larger pollen supply when only a small percentage of the umbels of the pollen parent have open flowers. This would make immediate pollination of the flowers of the seed parent more likely, which would be an advantage if many of them had been open for 3 days or more.—Univ. Idaho, Branch Exp. Stat., Parma.

3984. Elliott, I. L.
Onion growing trials on Rukuhia peat.
N.Z. J. Agric., 1955, **90**: 489, illus.

Under local conditions a water-table 2 ft. from the surface gave the best results in normal years. Field observations and yield data suggested that there was a greater response to N under conditions of a high water table than in well-drained soil.

3985. Ogura, H.
The effect of phosphorus on the growth of onion. [Japanese, with English summary 14 lines.]
Bull. Fac. Agric. Kagoshima Univ., 1954, **3**: 21-4, bibl. 9.

Growth, leaf number and leaf length were studied in a sand culture experiment. The plants were more susceptible to P deficiency at the beginning and end than in the middle of the season. The symptoms resembled frost damage.

3986. Kumar, K., and Sahay, R. K.
Effect of sulphur fertilization on the carbohydrate metabolism of onion.
Sci. and Cult., 1955, **20**: 601-2.

A local onion variety was given 4 levels of S fertilization, and carbohydrate fractions were analysed monthly. Reducing sugars showed an upward trend with S application up to 200 lb. per acre, but above this level there was a relative fall. Percentages of non-reducing sugars decreased with increased S fertilization. The trend of total sugars was similar to that of reducing sugars.—Banaras Hindu Univ.

3987. Rao, S. N.
Certain physiological and morphological responses in potatoes and onions induced by maleic hydrazide.
Diss. Abstr., 1954, **14**: 1125, being *Publ.* 8508 of 112 pp.

Field studies showed that pre-harvest applications of 0·1% 2,4-D to onions after MH (0·25%) treatment counteracted the usual inhibiting effect of MH on storage growth. Anatomical studies of onion root primordia showed that MH treatment depressed tissue differentiation and retarded cell division.

3988. Ogata, K., Inoue, T., and Murata, T.
Studies on the storage of onions. (5) On the physiological influence of maleic hydrazide on onions during the ripening period. [Japanese, with English summary 8 lines.]
J. hort. Ass. Japan, 1955, **23**: 245-8, bibl. 8.

Treatment reduced catalase and peroxidase activity but did not affect contents of total and reducing sugars, ascorbic acid or dry matter.

3989. van Doorn, A. M.
Het kunstmatig drogen van uien ter bestrijding van koprot, *Botrytis allii* (Munn). **(Control of neck rot of onion by artificial drying.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1955, **18**: 250-8, bibl. 3, illus.

Three laboratory experiments are described in which onions were dried at 40° C. and 35° C. after varying periods of humid storage. The bulbs were harvested while the tops were still green. By drying the bulbs 7–10 days after harvesting the amount of neck rot was reduced. Later drying, especially after bad weather conditions, did not prevent fungal penetration of the bulb. The plants were too green for earlier drying to be effective. [See also *H.A.*, 24: 2757.]

3990. Scholes, M. E.
The effects of aldrin, dieldrin, isodrin, endrin and DDT on mitosis in roots of the onion (*Allium cepa* L.).
J. hort. Sci., 1955, **30**: 181-7, bibl. 11.

None of the insecticides tested, when used at doses equal to or greatly in excess of the recommended rates, had any effect on germination or growth rate on onion. Some slight effects were noted on the resting and dividing cells of root tips. Attention is drawn to the advantages of these compounds over *gamma*-BHC, chlordane and toxaphene as insecticides from the point of view of causing less damage to the plants [see *H.A.*, 25: 1727].—Elsenham, Bishop's Stortford, Herts.

3991. Mann, L. K.
Storage temperature and bulbing of garlic (*Allium sativum* L.).
Reprinted from *Proc. 8th int. bot. Congr. 1954*, Paris, pp. 305-6.

Mature garlic bulbs were stored at several temperatures for 1 to several months before planting in the field or greenhouse. At harvest time cloves sprouted slowly and erratically. After 4–6 weeks' storage at 10° or 15° C. they sprouted readily. With longer storage, a temperature of 10° C. followed by 5° C. resulted in most rapid sprouting. Cloves stored at 20° C. did not sprout quickly or readily, regardless of length of storage. Bulb storage at 5°–15° C. before planting induced early and rapid growth. Preliminary data indicated, however, that yield was more dependent on planting date than on pre-planting storage temperatures, except for late spring plantings. Plants from bulbs stored at 0° C. and 5° C. had narrow leaves and long false stems, and produced irregularly shaped bulbs at maturity. For certain planting dates, storage at 0° C. or 5° C. hastened maturity by as much as one month. Plants grown in the greenhouse from cloves which had not received prolonged low temperature storage before planting did not form bulbs. Flower-stalk formation was not induced by low-temperature storage treatments.—Univ. Calif., Davis.

3992. Jenkins, J. M., Jr.
Some effects of different day lengths and temperatures upon bulb formation in shallots.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 311-14, bibl. 4, illus.

Shallot plants, either grown from dry bulbs or from the division of field-grown plants, produced bulbs when exposed to 15 hours of light daily and to temperatures of 70° F. or higher. Plants grown at minimum temperatures of 70° F. formed small bulbs even at day lengths of 10 hours, but plants grown at low temperatures (28–40° F. minimum temperatures) did not form bulbs under either long or short day conditions. An exposure of only 7 days to 15 daily hours of light and temperatures of 68° F. or higher, caused bulb formation to be initiated, but the bulbs were much smaller than those formed by plants that received 12, 21 or 28 long days. This indicates that long days and relatively high temperatures are necessary for bulb formation in shallots; and that the effects of long days are cumulative. [Author's summary and conclusions.]—Veg. Res. Lab., Castle Hayne, N.C.

Rhubarb.

3993. Graham, T. O.
Rhubarb plant improvement under Canadian methods.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 35.

Information is given on the breeding methods used in the development of the present Canadian introductions, and on the changes that are being made in the rhubarb breeding programmes. Present varieties are classified with notes on their uses.

Root crops.

(*See also* 3462, 3463, 4032, 4065b, m, 4066a, i, 4195.)

3994. Banga, O.
Carrot yield analysis [Dutch summary ½ p.]
Euphytica, 1955, **4**: 116-26.

Evaluation of carrots on genotypical differences in yield is complicated by the presence of many non-genetic factors. The length and shape of the root are considered to be the simplest and most reliable indicators of productive capacity.—Inst. Vered. Tuinbouwgew., Wageningen.

3995. Banga, O., de Bruyn, J. W., and Smeets, L.
Selection of carrots for carotene content. II. Sub-normal content at low temperature. [Dutch summary ¼ p.]
Euphytica, 1955, **4**: 183-9, bibl. 6, illus.

The influence of temperature (8° and 18° C.) on the total carotenoid content and shape of 4 carrot varieties was studied. At the lower temperature the total carotenoid content was sub-normal, and the root was relatively narrow, long and conical. It was concluded that a carrot grown at a relatively low temperature remains unripe for longer than normal, and that this is the reason for the low carotene content.—Inst. Vered. Tuinbouwgew., Wageningen.

3996. Watanabe, S.
On germination of Kintoki carrot seeds. II. Effects of pericarp removal, soaking and drying, and sun drying of seeds. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **23**: 237-44, bibl. 22.

Percentage and speed of germination were increased by the treatments in question and by storage.

3997. Bachmann, F.
Versuche zur Bekämpfung der Möhrenfliege (*Psila rosae* F.). **(Carrot fly control.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 104-6.

Of 5 materials tested for carrot fly control diazinon and parathion are recommended. The rows were sprayed with ¼ l. per metre run, using a spray of 20 g. material in 100 l. water. Spraying of early-sown carrots took place in the first half of June. Late-sown and long-season carrots needed 2 or 3 sprays, the first application being given when the leaves were about 10 cm. high. Aldrin could not be recommended on safety grounds.—Wädenswil.

3998. Bremer, H., and Orth, H.
Weitere Untersuchungen zur Bekämpfung der Möhrenfliege (*Psila rosae* F.). **(Further control tests for carrot fly.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 106-7, bibl. 8.

Several experiments were carried out with lindane, aldrin, and chlordane materials for carrot fly control. The best control with early and late sowings was obtained with aldrin-concentrate dusted (after mixing with sand) at 3 g. per square metre. Seed treatments with 20–50 g./kg. carrot seed are also recommended. There was only slight inhibition of carrot germination by aldrin. Lindane dusting alone or in addition to seed treatment gave good control, but seed treatment alone was not satisfactory. Chlordane dusting gave only moderate control.—Biol. Bundesanst., Neuss-Lauvenburg.

3999. I'só, I.
A szárazanyag eloszlása a csicsókagumóban. **(Distribution of dry matter in the tuber of Jerusalem artichoke.)** [Russian and English summaries ⅔ p. each.]
Növénytermelés, 1955, **4**: 127-32, bibl. 4, illus.

The dry matter content of the tuber was found to be greater near the skin than in the inner portion. There was a marked decrease in dry matter content in inner segments of the tuber progressing from the heel to the crown.

4000. Thompson, B. D., and Decker, P.
The occurrence of two types of hypocotyl discoloration of harvested radishes.
Plant Dis. Reptr, 1955, **39**: 416-17, bibl. 3, illus.

Hypocotyl discoloration of harvested radishes due to downy mildew (*Peronospora parasitica*) did not spread materially to healthy radishes in the package. The trouble could be eliminated by field control [not specified] and careful grading. The maintenance of a storage temperature of about 40° F. was found to control another type of radish discoloration the cause of which was unknown. The symptoms of both diseases are described and illustrated.—Fla agric. Exp. Stat., Gainesville.

4001. Umgelter, H.
Was kann gegen die Vermadung der Rettiche unternommen werden? **(The control of maggots in black radishes.)**
Gesunde Pfln, 1954, **6**: 176-8, from abstr. in *Z. PflKrankh.*, 1955, **62**: 410.

Watering black radish plants with a 0·035% solution of E 605 forte successfully controlled *Chortophila brassicae* and *C. floralis* for a period of 14 days, while an aldrin preparation gave less favourable results.—Pflanzenschutzamt Stuttgart.

4002. Stewart, W. W. A.
Control of the turnip maggot in rutabagas in Saskatchewan.
Publ. Canada Dep. Agric. **950**, 1955, pp. 4, illus.

Swedes, cauliflower and cabbage are the chief cultivated hosts of the turnip maggot (*Hylemyia floralis*). Effective control is given by 25% heptachlor at the rate of 16 lb. in 80 gal. water per acre, or by 50% dieldrin at 8 lb. in 80 gal. water per acre. Applications must be made as soon as egg-laying begins, which in Canada is in the second or third week of July. Two or more applications should be made at intervals of 10 days.

Salad crops.

(*See also* 3468-3471, 3493, 4065o, 4195.)

4003. Morgan, C. N., and Stephens, S. E.
Lettuce, celery and some other greens.
Qd agric. J., 1955, **80**: 205-17, illus.

Crops grown primarily as salad greens in Queensland are discussed. Those considered are lettuce, celery, spinach, New Zealand spinach (*Tetragonia expansa*), orach (*Atriplex hortensis*), summer spinach (*Amaranthus gangeticus*) and shallots.

4004. Watts, L. E.
Synonymy in lettuce varieties.
A.R. nat. Veg. Res. Stat. Wellesbourne for 1954, 1955, pp. 16-36, 1 plate.

232 varieties of summer lettuce have been grown at the N.V.R.S., Wellesbourne, and are placed into 60 synonymous groups. Methods of delimiting synonymous groups, and details of each of these groups are given. An index of varietal names is attached as an appendix. [Author's summary.]

4005. Choudhri, R. S., and Bhatnagar, V. B.
Response of lettuce (*Lactuca sativa* L.) to spraying with maleic hydrazide. [Spanish summary ¾ p.]
Phyton, 1955, **5**: 19-30, bibl. 21, illus.

Well established cabbage lettuce plants (*Lactuca sativa* L. var. Wonderful) sprayed 3 weeks after transplanting with 0·05, 0·10 and 0·20% solutions of maleic hydrazide (without any wetting agent) exhibited a marked degree of growth inhibition under all concentrations. Three weeks following treatment, however, a number of axillary buds developed to form as many flowering shoots in plants sprayed with 0·05% MH solution. Even plants sprayed with 0·10% MH resumed growth approximately 6 weeks after treatment and developed a few axillary shoots. The apical meristem, however, did not recover to resume growth in any of the treated series of plants. With the suppression of growth of the apical meristem, heading in sprayed plants stopped. Plants in the 0·10 and 0·20% series entered the senile stage earlier and died prematurely. Leaves of plants sprayed with maleic hydrazide grew thicker and brittle with advancing age, and those in the 0·10 and 0·20% MH series exhibited a marked degree of chlorosis symptomatic of elemental deficiency. Flowering was 1 to 2 weeks earlier in 0·05% MH-treated plants than in the untreated controls, while it was delayed by about the same period in the next higher series. No flowering occurred in plants treated with 0·20% MH. Fruits formed on plants treated with 0·05% MH were far fewer and lighter in weight than those on the untreated controls. Treatment of semi-mature heads (6 weeks after transplanting) was apparently advantageous as it prevented any form of bolting, axillary or terminal. This lengthened the availability of edible lettuce heads by about 2 or 3 weeks compared with controls, which bolted far too early. [From authors' abstract.]—Hindu Univ., Banaras.

4006. Stewart, J. K., and Foster, R. E.
Observations on rib discoloration and tip burn of lettuce.
Plant Dis. Reptr, 1955, **39**: 418-20.

Susceptibility of lettuce varieties and strains to rib discoloration and tip burn was found to differ greatly, which suggests that more resistant strains could be developed by breeding. No significant relationship existed between severity of tip burn and severity of rib discoloration, nor was there any correlation between occurrences of these two physiological disorders.

4007. Cox, R. S.
A preliminary report on diseases of lettuce in the Everglades and their control.
Plant Dis. Reptr, 1955, **39**: 421-3, illus.

Three diseases, downy mildew (*Bremia lactucae*), bacterial soft rot (*Erwinia* sp(p.)) and rib breakdown seriously jeopardize the lettuce industry in the Everglades of Florida. Experimental work showed that zineb adequately controlled downy mildew, and streptomycin applied as a dip or painted on the butts of the heads showed real promise in control of the soft rots. Neither the cause nor control of rib breakdown is known, but its similarity to brown blight is noted. [Author's abstract.]—Everglades Exp. Stat., Univ. Fla, Belle Glade.

4008. Hopkins, L., Abu Yaman, I. K., and Carruth, L. A.
Flavor evaluation and residue analysis of malathion-treated lettuce.
J. econ. Ent., 1955, **48**: 151-2, bibl. 4.

The flavor evaluation tests were in agreement with the residue determinations, and indicate that no measurable effects could be found on lettuce harvested from 3 to 12 days after treatment with effective recommended dosages of malathion. [Authors' conclusion.]

4009. Herold, F.
Die "Kranzfäule" (Blattrandbrand) der Endivie. **("Centre rot" (marginal leaf scorch) of endive.)**
Phytopath. Z., 1955, **24**: 43-54, bibl. 6, illus.

A disease of endive is described which occurred in a vegetable growing area near Düsseldorf. Its symptoms are marginal leaf scorch and, later, rotting of the central crown leaves. This latter rot was shown to be due to an excessively high salt concentration in the soil and to be identical with what the Dutch have termed "randen". The trouble is cured by low fertilizer applications, especially in dry years, and by the supply of organics. In danger areas cultivation should be restricted to some less popular but more resistant varieties, which are named. As it is difficult to distinguish "centre rot" from a bacterial disease of endive caused by *Pseudomonas marginalis*, a comparison of the symptoms of both diseases is made, supported by photographs.—Inst. f. Gemüsebau u. Unkrautforsch., Neuss-Lauverburg.

Spinach.

(*See also* 3467, 4066e.)

4010. Thompson, A. E.
The extent of natural crossing in inbred monoecious spinach lines.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 405-9, bibl. 4.

The percentage of natural crossing among inbred monoecious lines of spinach ranged from 19·6 to 98·8. Differences in the percentage of natural crossing between the 3 female lines and the 10 male lines were highly significant. Many of the differences could be attributed to the time and length of anthesis and the amount of pollen dispersed by the male lines. The high percentage of natural crossing observed in this experiment serves to establish the feasibility of the use of monoecious inbred lines in the production of F_1 hybrid seed in spinach.—Univ. Ill., Urbana.

4011. Thompson, A. E.
Methods of producing first-generation hybrid seed in spinach.
Mem. Cornell agric. Exp. Stat. **336,** 1955, pp. 48, bibl. 24, illus.

Methods were studied for the production of essentially pure F_1 hybrid seed in spinach. Treatments designed to modify the sex ratio of the plants were applied with a view to producing a large proportion of female plants which could then be used as female parents. The only treatments producing significant modifications of the sex ratio were those involving spacing, day length, temperature and planting dates. Large varietal differences were noted in the various studies. A study was also made of the effectiveness of selecting and inbreeding monoecious lines. Selection of different classes of plants on the basis of the female value was effective but less so than had been anticipated. There were indications that effective selection of highly female monoecious lines can be made, but a progeny test is necessary to identify these selections properly. A method is proposed for the production of essentially pure single-cross F_1 hybrid seed, involving the use of a highly female, monoecious inbred as the female line and a selected variety, or a highly male, monoecious inbred, for the male parent. Two other methods of producing F_1 hybrid seed, involving a 3-way cross, are proposed. The relative efficacy of these methods can only be determined when experimental hybrids have been produced and tested.

4012. Vlitos, A. J., and Meudt, W.
Interactions between vernalization and photoperiod in spinach.
Contr. Boyce Thompson Inst., 1955, **18**: 159-66, bibl. 9.

Spinach seed of the long-day variety Nobel was soaked in a KH_2PO_4 solution to retard germination until the seeds were sown, and was then stored at vernalization temperatures of 2° and 5° C. and at higher temperatures of 15° and 20° C. for periods of 2, 4 and 8 weeks. The seeds were then sown in greenhouse flats and grown under 18, 14, 12, 10 and 8-hour photoperiods in the greenhouse or temperature-controlled light rooms. Vernalized seed gave rise to plants that formed flowers sooner or in higher percentages at all photoperiods above 8 hours in the greenhouse, and at all photoperiods including 8 hours in the light rooms, than unvernalized seed. The critical photoperiod necessary for flowering fell from 14 to 8 hours as a result of vernalization. As the length of the vernalization period was increased from 2 to 8 weeks the acceleration of flowering at shorter photoperiods was more pronounced. Preliminary studies indicated that soaking the seed in phosphorylated sugar solutions prior to vernalization accelerated and increased the percentage of flowering when the resultant plants were grown under an 18-hour photoperiod.

Tomatoes, capsicums and eggplants.

(*See also* 3454, 3463, 3465, 3466, 3474, 3476, 3496, 3498q, 3608, 3870, 4065a, f, g, i, k, n, v, 4066 l, m, o, 4195, 4475.)

4013. Carncross, J. W. [Editor].
American Tomato Yearbook 1955.
Westfield, N.J., 1955, pp. 40, bibl. 5 pp., $2.00.

A special feature of this issue is a list of research projects carried out in the U.S.A. and Canada, with names and addresses of the workers concerned in them. Other items include statistics of tomato production in the United States and Canada and a bibliography of recent papers on tomato culture in the United States.

4014. Porte, W. S., and Smith, F. F.
Commercial production of greenhouse tomatoes.
Fmrs' Bull. U.S. Dep. Agric., **2082**, 1955, pp. 30, illus.

The culture of greenhouse tomatoes from seed to harvest is covered in this bulletin, which supersedes one published in 1924. Varieties grown have changed during the interval, the original English varieties having been used as parents in breeding new American varieties. More space is given to maintaining a satisfactory greenhouse environment, to pollination methods, and to insect and other pests than in the earlier bulletin.

4015. Alexander, L. J., and Hoover, M. M.
Disease resistance in the wild species of tomato. Report of the National Screening Committee.
Res. Bull. Ohio agric. Exp. Sta., **752**, 1955, pp. 76.

The results published in this bulletin mark the most comprehensive survey of the wild species of the genus *Lycopersicon* for disease resistance ever attempted. The accessions of the species *Lycopersicon peruvianum* apparently possess resistance to more diseases than any of the other 4 species screened. It is within this species that resistance to both races of *Fusarium oxysporum* f. *lycopersici* was found in the same accession. Accessions of this species also offer the greatest promise for resistance to the root-knot nematode complex, resistance to races of *Cladosporium fulvum*, and resistance to tobacco mosaic, frost tolerance, and Stemphylium leaf spot. *Lycopersicon pimpinellifolium* and the suspected crosses between it and *L. esculentum* apparently offer most promise of resistance to late blight caused by *Phytophthora infestans*. Within this species a high order of resistance to several races of *Cladosporium fulvum* has been found and accession 79532 has served as the resistant parent in most of the breeding work for resistance to race 1 of the Fusarium wilt organism. [From authors' discussion].

4016. Clarke, E. J.
Some aspects of tomato breeding at the Albert College [Dublin].
Sci. Hort., 1952-54, **11:** 140-9, bibl. 5, illus.

In developing true-breeding leafmould-resistant tomato strains 2 serious obstacles have appeared: an apparent linkage between a small-fruited condition and leafmould resistance, and the occurrence of a genetical leaf spot necrosis in F_2 resistant hybrid generations. The dominance of leafmould-resistance under certain conditions provides a quick and easy means of obtaining heavy-cropping resistant strains by using F_1 resistant hybrids. In attempts to increase yields of glasshouse tomatoes by the use of hybrid vigour, crossing of commercial types gave better results than crossing non-commercial types with commercial types. There was no apparent gain from intracrossing as compared with selfing. A broad basis for classification of tomato seedlings is suggested.

4017. Istituto di Allevamento Vegetale per la Cerealicoltura.
Le più recenti razze elette avena, frumento, mais, orzo, pomodoro, riso, segale, sorgo dell'Istituto di Allevamento Vegetale per la Cerealicoltura. **(Varieties of oats, wheat, maize, barley, tomato, rice, rye and sorghum recently bred at the Grain Crop Plant Breeding Institute.)**
(*Publ.*) *Ist. Allev. veg. Cèrealicolt., Bologna*, 1953, pp. 39, illus.

Including 6 eating and processing varieties of tomato selected or bred from the variety Ladino di Panocchio.

4018. Patron, A.
Teneur en extrait sec et en acide ascorbique de quelques variétés de tomates mises en culture par le Service de l'Horticulture en 1963. **(Dry matter and ascorbic acid contents of certain tomato varieties introduced [to Morocco] by the Horticultural Service in 1953.)**
Fruits et Prim., 1955, **25:** 20.

Figures are given for a dozen U.S. and Italian varieties. Red Jacket was the best for juice and purée and Re Humberto and San Marzano for canning peeled.—Lab. Technol. I.F.A.C. Maroc.

4019. Johnston, D. A.
The Lakeland tomato. A variety that has proved successful for winter production.
J. Agric. W. Aust., 1955, **4:** 245-7, illus.

Trials were carried out in which Lakeland was compared with a local winter tomato variety Wanneroo Late. Yields from Lakeland were 25% higher than from Wanneroo Late and more high grade fruit was produced.

4020. Singh, H. B., and Sikka, S. M.
Pusa has some outstanding tomatoes.
Indian Fmg, 1955, **5**(3): 18-25, illus.

Improved tomato varieties which have given outstanding performances in trials at the Indian Agricultural Research Institute, New Delhi, are Sioux, Improved Meeruti and Pusa Red Plum (syn. Hybrid 6). Advice is given on culture and seed production.

4021. Haskell, G., and Brown, A. G.
Hybrid vigour in cultivated tomatoes. [Dutch summary, ½ p.)
Euphytica, 1955, **4:** 147-62, bibl. 15.

A historical account is given of the theoretical aspects and practical use of hybrid vigour in tomatoes. Methods of producing hybrid seed in England are described, and the experimental results of outdoor trials with new hybrids at the John Innes Institution from 1940-1949 are given in detail. Heterosis has its main economic value in increased early cropping, and hybrids have somewhat more stable yields than commercial varieties under varying environmental conditions.—John Innes hort. Instn.

4022. Šuin, K. A.
Characteristics of tomato seeds in relation to their position on the mother plant. [Russian.]
Sad i Ogorod, 1955, No. 6, pp. 19-20.

Evidence is presented showing that seed of the 2nd and 3rd trusses is of better quality than that of the 1st.

4023. Marx, K.-H.
Treibtomaten unter Gartenklarglas und Blankglas. **(Greenhouse tomatoes under " horticultural clear glass " and ordinary glass.)**
Gartenwelt, 1955, **55:** 185.

Earlier measurements had shown that on a clear day the light intensity in a greenhouse under " horticultural clear glass " was 5% higher than under ordinary glass. In experiments with two tomato varieties in 1953 and 1954 it was found that the higher light intensity under " horticultural clear glass " in April and May advanced fruit ripening and thereby increased yields to the middle of July by as much as 11%.—Univ. Bonn.

4024. [Newell, J.], and Shill, O. W. [Editor].
Modern propagation methods under glass.
Sci. Hort., 1952-54, **11:** 171-5.

Some results of cultural trials with tomatoes and lettuce at the John Innes Institution are given. These show that improved cultural techniques (pricking out early, using 3½ pot size or soil blocks, and a rich compost) resulted in larger yields.

4025. Gončarov, B. P.
The effect of the intensity of light on the growth and development of tomato seedlings. [Russian].
Bot. Žurnal, 1954, **39:** 890-4, illus.

The experiments described show that for raising tomato plants under artificial light in nutrient solutions at about 25°C, the optimum light intensity lies within the range of 400,000 to 600,000 ergs.

4026. (Calvert, A.)
Temperature and tomato flowering.
A. R. John Innes hort. Instn, 1954, 1955, p. 26.

Variations in temperature between sowing and germination did not appear to affect the number of leaves to the first inflorescence. A temperature of 55°F. during the first month from pricking out reduced leaf number and increased the number of flowers on the first inflorescence, but it also reduced the rate of growth. The leaf-temperature effect was not apparently influenced by length of day, and its magnitude varied with variety.

4027. Nuttall, V. W.
The use of plant protectors at Morden, Manitoba.
Rep. Proc. 11th annu. Mtg west Canad. Soc. Hort. 1955, Banff, Alberta, pp. 82-3.

Meteor tomatoes planted out under so-called "Hotents" in mid-May gave earlier and bigger yields than those transplanted 3 weeks later without protection. The high cost of the extra labour, however, offset the profit obtained from increased yields.

4028. Kerr, E. A., and Kribs, L.
Electric vibrators as an aid in greenhouse tomato production.
From abstr. in *Agric. Inst. Rev.*, 1955, **10**(3): 34.

Touching the flower-bearing trusses with an electric vibrator was compared with the conventional method of pollinating tomatoes, namely tapping the stakes supporting the plants. Vibrating the flowers took approximately twice as long as tapping the stakes. The vibrator method resulted in larger, higher quality fruits that matured more rapidly. Vibrated plants produced both a higher total number of fruits and a higher number of marketable fruits than tapped plants. Varieties which are poor pollen producers or have slightly protruding pistils will derive more benefit from the vibrator method than varieties which set fruit readily.—Ont. Dep. Agric., Vineland.

4029. Teubner, F. G., and Wittwer, S. H.
Effect of N-m-tolylphthalamic acid on tomato flower formation.
Science, 1955, **122:** 74-5.

It had been found that *N-m*-tolylphthalamic acid was of practical value for promoting early fruit set of field-grown tomatoes when cool nights prevent normal pollination of the first flowers. In greenhouse tests the chemical was applied at 200 p.p.m. to foliage of 8 tomato varieties at anthesis of each of the first 3 trusses. Since environmental conditions were favourable treatment had no effect on fruit set but it caused a striking increase in the number of flowers and fruits formed on the 4th to the 7th trusses. In a field test 3 applications of the chemical were made in June at weekly intervals during the flowering of the first trusses. Determinate varieties were not appreciably affected, but on indeterminate varieties growth of the main axis terminated by 25 July in clusters of 50-100 flowers; maturity was delayed and total production decreased. In an attempt to increase the number of flowers on the first truss plants were sprayed at the cotyledon expansion stage or a week later with 5 concentrations of *N-m*-tolylphthalamic acid (50-400 p.p.m.). Treatment at cotyledon expansion had no effect on flower differentiation. Application of 300 p.p.m. 1 week later, however, resulted in a significent increase in flower number on the first truss; later trusses were unaffected. Application of 400 p.p.m. also increased flower number but tended to cause the main axis to terminate with the first truss.—Mich. agric. Exp. Stat., E. Lansing.

4030. Hockey, K. C., and Ball, E.
Glasshouse tomato spacing trials.
N.Z. J. Agric., 1955, **90:** 608.

Tomatoes plants spaced in double rows at 18 in. square, with 27 in. between the double rows, yielded 29·7 lbs. per square yard of glasshouse area. Plants at a normal spacing (14 instead of 18 in. between the plants in the row) yielded 27·2 lbs. for the same area.—Massey agric. Coll.

4031. Geissler, T.
Weitere Ergebnisse von der Hydrokultur bei Gemüse unter Glas. **(Further studies on the soilless culture of vegetables under glass.)**
Dtsch. Gartenb., 1955, **2:** 155-7, illus.

(1) *Tomatoes:* The following yields per plot (6 plants) were obtained from early glasshouse tomatoes grown in (a) subirrigated gravel culture, 29 kg., (2) water culture, 23 kg., and (c) soil, 16 kg. In terms of financial returns the results were even more markedly in favour of subirrigation. (2) *Glasshouse cucumbers* grown in subirrigated gravel beds, newly established on a commercial scale, yielded 18·7 kg. per plant as compared with 15·5 kg. per soil-grown plant. (See also *H.A.*, 24: 3828). Dry matter and content of vitamins A, B and C of cucumbers remained unaffected by the medium in which the plants were raised.—Inst. f. Gartenbau, Grossbeeren.

4032. Rauterberg, E., and Lenhard, G.
Der Einfluss von Zusammensetzung und Konzentration der Nährlösung auf die Entwicklung von Tomaten und Kohlrabi bei der Hydrokultur. **(The effect of nutrient solution composition and concentration on the development of tomatoes and kohlrabi in water culture.)**
Z. PflErnähr. Düng., 1955, **68:** 132-41, bibl. 2.

Tomato and kohlrabi plants were grown in water culture with varying levels of N, K_2O and P_2O_5. In 1952 the highest yield of tomatoes was obtained from plants receiving these nutrients in the proportion of 1:1:0·69, with a salt concentration of 2%. The weekly nutrient uptake showed a constant increase during the first 6 weeks, and then a decrease. The uptake of P_2O_5 was higher during fruit set. The studies were continued in 1953. Plants with a high K_2O supply produced fruits which were very susceptible to blossom end rot, and the plants started to die back in mid-August. Fruits with high N ripened poorly. The highest yields in 1953 were obtained from plants receiving nutrients in varying concentrations according to the stage of growth. Plants giving the highest yields contained little nitrate nitrogen. There was considerable variation in the results of the kohlrabi studies. In general, high salt concentrations resulted in lower yields than moderate salt concentrations, the most favourable being between 2·6 and 5·2%. High yields were also obtained from plants given an adjusted nutrient supply. Increased doses of K_2O and P_2O_5, particularly a combination of the two, gave increased yields.—Inst. PflErnähr., Bodenchem. und Bodenbiol., Berlin.

4033. Walsh, T., and Lamb, J. G. D.
A review of investigations on tomato nutrition in Ireland.
Sci. Hort., 1952-54, **11:** 150-7, bibl. 11.

Most nutritional problems in tomato growing in Ireland are caused by excess rather than deficiency factors. The nutrient status of soils in tomato houses was examined; most of them were in the pH range of 6·5-8·0. Very high values of Ca, available K and available P were found. Levels of Na were higher than average; medium to very high levels of Mg were recorded. Ideal conditions for Fe deficiency existed in many houses. A number of soil samples tested showed subnormal levels of Mn. Organic matter contents were satisfactory, and high levels of nitrate N were recorded.

4034. Fong, T.-T.
A preliminary report on the effect of the application of nitrogenous fertilizers on growth of tomato plants with special emphasis on the application of calcium cyanamide.
[Chinese, with English summary, ½ p.]
Mem. Coll. Agric. nat. Taiwan Univ., 1954, **3** (4): 71-81, bibl. 23, illus.

Application of 9·375 g. N per plant was sufficient for normal growth throughout the season. Urea resulted in better growth than calcium cyanamide or ammonium sulphate. With calcium cyanamide the best results were obtained when it was mixed with compost and half the N came from each component of the mixture.

4035. Ozaki, H. Y., and Carew, J.
Foliar application of urea to tomatoes and beans.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 307-10, bibl. 5.

In sand culture experiments N-deficient tomato plants responded to dips of urea, urea+ziram or urea+bordeaux mixture (at a concentration of 2·5 lb. urea per 100 gal.), producing greater fresh weight than plants given fungicidal dips without area. N-deficient bean plants responded to dips of urea or urea+parathion, producing heavier plants than those sprayed with parathion alone, sucrose or water. Sucrose added to the urea treatments prevented urea injury but it also reduced the amount of fresh weight produced. It is suggested that the addition of urea to normal pest control sprays might improve the growth of N-deficient crops.—Cornell Univ. Ithaca, N.Y.

4036. Shaw, D. A., and Hilton, R. J.
Leaf-feeding of determinate tomato plants. II. Effects of urea and sucrose sprays under field conditions.
From abstr. in *Agric. Inst. Rev.*, 1955, **10** (3): 34-5.

Under field conditions in Central Alberta leaf-burning usually follows urea spraying of tomatoes. This was most severe during dull days and with high RH and was mitigated by adding sucrose to the spray. The sucrose appears to reduce the initial rate of urea absorption and to prolong the absorption period. With or without sucrose, the C:N ratio in leaves was depressed after spraying with urea, and significant increases in leaf nitrogen were noted 2-3 days after treatment. There was no direct evidence that the leaves absorbed sucrose; and since check plant performance indicated no lack of soil nitrogen, there was no significant influence of leaf sprays upon the growth periodicities of the plants.—Univ. Alberta, Edmonton.

4037. Kerr, E. A.
Some factors affecting earliness in the tomato.
Canad. J. agric. Sci., 1955, **35:** 300-8, bibl. 7.

Pollination and maturity dates were recorded for a large number of tomato fruits grown under glass in the spring for the production of F_1 hybrid seed. The earliness of 46 varieties as expressed by number of days (1) from seed planting to first bloom, and (2) from pollination to ripening, was determined. The variety Farthest North was exceptionally early in both categories. Xenia does not play an important role in earliness of tomato fruits. Counts of the seeds in the individual fruits showed: (1) no relationship between seed content of the fruits and earliness of the varieties; (2) that, within a variety, the fruits with the most seeds matured fastest—on the average an increase of 50 to 70 seeds hastened maturity by one day; (3) that the first three trusses had fewer seeds per fruit than later trusses. Position of the truss, in itself, does not affect rate of ripening. However, fruits at the distal end of the truss take longer to mature than those at the proximal end. [Author's abstract.]—Hort. Exp. Stat., Vineland, Ont.

4038. Forshey, C. G., and Alban, E. K.
Seasonal quality changes in greenhouse tomatoes.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 372-8, bibl. 7.

Tomato fruit quality, as indicated by pH, titratable acidity, reducing sugars, and total pectic substances, decreased with each successive harvest during the fall crop and increased with each successive harvest during the spring crop. At the beginning of the fall crop and end of the spring crop fruit quality was comparable to that of outdoor-grown tomatoes. At the end of the fall crop and the beginning of the spring crop, the fruits were definitely of inferior quality. Since light markedly influences the quality of many greenhouse crops and since correlation between quality and hours of sunlight, in the period in which the fruits made the major portion of their growth, was highly significant, it is possible that light is one of the major limiting factors in fruit quality. [From author's conclusions].—Ohio St. Univ., Columbus.

4039. Frazier, J. C., and others.
Effect of supplemental lighting on the ascorbic acid concentration of greenhouse tomatoes.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 351-9, bibl. 19.

Four different types of supplemental lighting, from 2 kinds of ultraviolet lamp, sodium lamps and incandescent lamps, were used on 5 glasshouse crops of Waltham Forcing tomatoes. No consistent increase in ascorbic acid concentration was found in the fruit irradiated during daylight hours. It appears that neither the addition of small bands of electromagnetic radiation of relatively high energy value in the ultraviolet region of the spectrum, nor bands of general radiation of relatively low energy in the visible region of the spectrum increased ascorbic acid concentration of glasshouse fruit consistently. The mean ascorbic acid production of this variety grown out of doors in the summer was no higher than the peak production of autumn and spring crops in the greenhouse.—Kans. agric. Exp. Stat., Manhattan.

4040. Fryer, H. C., and others.
Relation between stage of maturity and ascorbic acid content of tomatoes.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 365-71, bibl. 13.

Waltham Forcing tomatoes were grown as a spring crop in the greenhouse, some of the plants being given various types of supplemental illumination. A summer crop was also grown in the field. From analyses of the ascorbic acid contents of the fruits harvested at different stages of maturity the following conclusions are drawn: (1) At the time of harvest, red-ripe tomatoes in the greenhouse averaged at least 8% higher in ascorbic acid concentration than yellow-red fruits from the same truss. (2) Plants given supplemental lighting from blue fluorescent or sodium vapour lamps produced tomatoes with significantly less difference between red-ripe and yellow-ripe fruits at the time of harvest than did plants with no supplemental lighting. (3) At the time of harvest there was no important difference in ascorbic acid content between yellow-red and mature green tomatoes grown in the greenhouse. (4) Field-grown tomatoes showed a much greater difference in ascorbic acid content between yellow-red and mature green fruits than did greenhouse plants. (5) If yellow-red and mature green fruits are ripened to the red-ripe stage out of direct sunlight at a temperature of 75°F., the effect of supplemental lighting noted in (2) disappears almost entirely. (6) If greenhouse yellow-red and mature green fruits are ripened to the red-ripe stage as above, they maintain about the same relationship to each other with respect to ascorbic acid content, but each comes closer to the content of fruit at the red-ripe stage of maturity.—Kans. agric. Exp. Stat., Manhattan.

4041. Fryer, H. C., and others.
Effect of fruit cluster position on the ascorbic acid content of tomatoes.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 360-4, bibl. 8.

Waltham Forcing tomatoes were grown as staked plants in the greenhouse under 5 types of illumination. Analyses were made of the ascorbic acid concentrations of fruit from the different trusses. When the tomatoes were harvested red-ripe there was an essentially linear increase in ascorbic acid concentration with increasing truss number up the plant. This regression of ascorbic acid content on truss position appeared to be practically unaffected by supplemental lighting. Larger regression coefficients were obtained for spring than for autumn crops but the differences were not significant. The average increase in ascorbic acid concentration with each succeeding truss may be as low as 3 or 4% or as high as 10%. The degree of ripeness did not materially affect the regression if the fruits were at least mature ripe when harvested; therefore the factor causing this regression exerts its influence before or during the mature green stage of maturity. A limited study of field-grown tomatoes suggested that the regression found for greenhouse tomatoes does not occur in the field where there is plenty of sunlight and an abundant supply of soil nutrients.—Kans. agric. Exp. Stat., Manhattan.

4042. CALDWELL, J.
The movement of tobacco mosaic virus in the tomato.
New Phytol., 1955, **54:** 89-94, bibl. 19.

Current views on the method of the movement within the plant of tobacco mosaic virus are noted and discussed. [From author's summary.]

4043. KLECZKOWSKI, A.
Inactivation of antibodies by ultraviolet radiation.
Reprinted from *Brit. J. exp. Path.*, 1954, **35:** 402-13, bibl. 10.

The quantum yield for inactivation by ultraviolet radiation of λ 2537 Å is *c.* $0 \cdot 96 \times 10^{-3}$ for the antibodies to tomato bushy stunt and tobacco mosaic viruses. [From author's summary.]—Rothamsted exp. Sta., Harpenden.

4044. GRÜMMER, G.
Die Beziehungen zwischen dem Eiweissstoffwechsel von Kulturpflanzen und ihrer Anfälligkeit gegen parasitische Pilze. **(The relations between the protein metabolism of cultivated plants and their susceptibility to parasitic fungi.)**
Phytopath. Z., 1955, **24:** 1-42, bibl. 67, illus.

The relationship was studied between the protein content, the protein level (protein N in % total N) and the chlorophyll content of oil poppy, tomato and potato leaves and their susceptibility to *Helminthosporium papaveris* and *Phytophthora infestans* respectively. With all three species it was found that protein decomposition predisposed the foliage to infection by the pathogens. Chlorotic tomato leaves, for instance, were much more susceptible to blight than were green ones. Among hybrids between *Solanum pimpinellifolium* and a tomato variety, early-maturing, large-fruited plants were attacked by *Phytophthora infestans* much sooner and much more severely than late-ripening plants with small fruits. The greater susceptibility of the large-fruited plants was associated with earlier and more complete decomposition of the leaf protein. Similar results are reported for poppy and potato, and a review of the literature suggests that also in cereals susceptibility to rust and other diseases is determined by the protein metabolism.—Ernst.-Moritz-Arndt Univ. Greifswald.

4045. MILLER, P. R., AND O'BRIEN, M. J.
Tomato late blight: Its world distribution and present status. [Summary in Interlingua, ½ p.]
Plant Dis. Reptr., Suppl. **231,** 1955, pp. 89, bibls., maps.

This paper presents a study of *Phytophthora infestans* (Mont.) D By. on *Lycopersicon esculentum* L., including records of first-reported occurrence of tomato late blight, its distribution, spread, the damage it causes, control measures applicable and the existence and number of strains of the fungus. Data were obtained on a world-wide basis. Reports are given for 28 countries and territories in Europe, 29 in Africa, 11 in Asia, 9 in the Australasian area, 10 in South America, 5 in Central America, 7 in the Caribbean area, and all of North America. First appearance records show that late blight was reported on tomato for the first time as early as 1843 and as recently as 1954. Recent first reports are concentrated in Africa. Late blight of tomato is world-wide in its distribution. Spread under natural conditions is governed usually by local environmental factors, including proximity to blighted potatoes, endemic spots and infected nursery seedbeds. Weather conditions affecting the spread of late blight are wind, rain, high humidity and temperatures not in excess of 70°F. Of particular interest is the recent appearance of late blight on tomato in areas where it had previously never been found, i.e. in parts of Africa and some mid-western and north-central States of the United States. The damage reported varies widely, and estimates of losses range from very slight to total destruction in years of severe epidemics. Bordeaux mixture is a universally employed control measure. Other copper compounds are also used, as well as the newer organic fungicides. Races in *Phytophthora infestans* have not been investigated as yet in some areas. In several countries such studies are being made although many are concerned primarily with the strains of the fungus on potato. However, in several countries different biotypes on tomato have been determined. Distribution maps are given in each continental section. [From authors' summary.]

4046. STRONG, M. C.
Spraying tomatoes with fixed coppers and carbamates.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37:** 477-85, bibl. 5, illus.

Applications of fixed copper in a tank mix with either ziram or zineb gave good control of *Alternaria* and *Septoria* blights and anthracnose of tomato. A tank mix of fixed copper and ferbam, however, was inferior to the use of fixed copper alone.

4047. HARRISON, A. L.
Damping-off of tomato transplants.
From abstr. in *Phytopathology*, 1955, **45:** 347-8.

Losses were reduced by 50-100% by adding certain named copper, organic mercurial and thiocarbamate fungicides to the transplant water.

4048. SCHAFFER, H. G.
Shingle base for tomatoes beats sick soil.
Grower, 1955. **44:** 231, illus.

In glasshouses where the soil was nematode-infested and had a high salt content, late-planted tomatoes in whale-hide pots set on shingle showed better rooting and promised larger crops than those rooting in the glasshouse soil.

4049. THIEGS, B. J.
Effect of soil fumigation on nitrification.
Down to Earth, 1955, **11** (1): 14-15, illus.

Chloropicrin, methyl bromide and ethylene dibromide temporarily inhibit nitrification, thus preventing the rapid transformation of ammonia N into nitrate N.

Greenhouse experiments on tomatoes show that poor growth and injury to plants due to high ammonia nitrogen levels appear to be most likely to occur in acid soils low in nitrates. The presence of nitrates seems to decrease ammonia toxicity. It is therefore suggested that with plants of known or questionable ammonia sensitivity, nitrate fertilizers should be used when the soil is fumigated with Dowfume MC-2 (98% methyl bromide and 2% chloropicrin). Fertilizers containing both ammonia and nitrate nitrogen may sometimes be safely used. The problem is not so serious when Dowfume W-85 (ethylene dibromide) is used, but a combination nitrate and ammonia nitrogen fertilizer would be preferable to one containing only ammonia for crops sensitive to ammonia.

4050. Rosa, M.
Fumigazione su terreno destinato a colture di pomodori e peperoni, eseguita in pieno campo con mezzo meccanico. **(Field-scale mechanized fumigation of soil for the culture of tomatoes and sweet peppers.)** [English summary, ½ p.]
Bol. Staz. Pat. veg. Roma, 1954, **12**: 79-96, bibl. 6, illus.

Using Planet Junior equipment powered by a 1½ h.p. engine, chloropicrin and chlorobromopropene were injected at 16-17 cm. depth and various rates 3-4 weeks before planting. Tomato yields were 2·85-3·69 kg. per plot fumigated at 8-12 c.c. per metre length compared with 2·25 kg. in the control, the 2 highest being from the 11 c.c. chloropicrin and the 11 c.c. chlorobromopropene plots. In the pepper plots treated with 9 and 12 c.c. chloropicrin per metre and the control, the yields were 487, 447 and 244 kg. respectively, and the tracheoverticilliosis infection rates were 17, 19 and 84% respectively. The performance of the equipment is discussed. [See *H.A.*, 25: 681.]

4051. Craft, C. C., and Heinze, P. H.
Physiological studies of mature-green tomatoes in storage.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 343-50, bibl. 7.

Physiological studies were made on mature-green tomatoes stored at 32, 40, 50, 65, and 75° F. for 4, 9 and 14 days, and on tomato fruits allowed to ripen at 65° after previous storage at 32, 40, 50° for 4, 9 and 14 days. Mature-green tomatoes stored at 32° for 9 and 14 days failed to ripen properly and showed indications of low-temperature injury when transferred to 65°. Alcohol-insoluble solids decreased in mature-green tomatoes as the temperature of storage increased. Soluble solids and reducing sugars increased slightly in the tomatoes stored for the shorter periods but decreased with longer storage. Total acidity and pH values did not show any appreciable changes. The ascorbic acid content of tomato fruits showed no pronounced change with storage temperature. It does not appear that ascorbic acid is associated with low-temperature injury in tomatoes. Tissue from mature-green tomatoes stored at the lower temperatures for 4 days was able to reduce a tetrazolium salt enzymatically at a greater rate than tissue from fruits stored at higher temperatures for a similar period. [Authors' summary.]—U.S. Dep. Agric., Beltsville, Md.

4052. Radspinner, W. A.
Commercial aspects of ripening mature-green tomatoes with ethylene gas.
Pre-Pack-Age, 1954, **8** (4): 17-18, 20-21, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1864.

Tomatoes give off ethylene as they ripen, but not enough to be useful in commercial ripening rooms. Daily applications of ethylene at a concentration of 200 p.p.m. to mature-green tomatoes at 68°F. (20°C.) increased the rate of ripening, so that 50% of the fruit was ready for pre-packaging in 4 or 5 days, compared with 6 or 7 days without ethylene. Ethylene had little effect on tomatoes approaching the stage of turning colour.

4053. Farrell, K. T., and others. [Editors.]
Colour in foods. Symposium, 1953. Quartermaster Food and Container Inst. for the Armed Forces, Chicago; Nat. Acad. Sci., Nat. Res. Coun. Wash., 1954, pp. vi+186, from abstr. in *J. Sci. Food Agric.*, 1955, **6**: ii-42.

Among the papers presented are: Instruments for the study of colour. Colour measurements with tomatoes, by N. W. Desrosier; Potential application of the rapid scanning spectrophotometer for the objective evaluation of food colour, by R. Pomerantz; Comparison of colour-measuring instruments, by C. O. Chichester; Measurement of colour and colour differences in relation to quality. Colour inspection—California Department of Agriculture, by S. R. Whipple; Effect of heat treatment on plant carotenoids, by A. Joyce; and Pigment changes in tomatoes ripened at 90°F., by F. J. Francis.

4054. Paul, P., and Sween, E.
Freezing tomatoes.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **37**: 581-3.

How it can be done is set out, but the product is difficult to handle and not very attractive.

4055. Anon.
The tomato's new career.
Agric. Res. Wash., 1955, **3** (11): 15.

Tomatine, an antibiotic substance isolated from stems and leaves of tomato plants, is capable of inhibiting the growth of the wilt fungus, *Fusarium* [*lycopersici*], and has also proved active against certain fungi causing human and animal diseases. The chemical breakdown of this substance produces another compound, tomatidine, which can be the source of cortisone and some sterols.

4056. Uphof, J. C. T.
De groene peper in de Verenigde Staten. **(Green or sweet peppers in the U.S.A.)** [English summary, 7 lines.]
Meded. Dir. Tuinb., 1955, **18**: 493-7, illus.

The author considers that sweet peppers could be grown in the Netherlands, if early varieties which develop satisfactorily in a mild climate were used.

4057. Russell, W. A.
The use of plant protectors at Indian Head, Saskatchewan.
Rep. Proc. 11th annu. Mtg west. Canad. Soc. Hort. 1955, Banff, Alberta, p. 83, bibl. 1.

The results of cultural trials showed that early sowing, early transplanting and covering with "hotkaps" all significantly improved the yields of peppers over late sowing and planting dates with no protection. The average ripe fruit size of covered plants was smaller than that of uncovered plants.

4058. Hare, W. W.
Resistance to Cercospora in pepper.
From abstr. in *Phytopathology*, 1955, **45:** 347.

In trials in 1951/54 4 small-fruited hot pepper varieties from Brazil and Puerto Rico were found to be resistant to leaf blight (*Cercospora capsici*).

4059. Crossan, D. F., and Krupka, L. R.
The use of streptomycin on pepper plants for the control of *Xanthomonas vesicatoria*.
Plant Dis. Reptr., 1955, **39:** 480-3, bibl. 5.

The data presented on Agrimycin-100 (15% streptomycin and 1·5% Terramycin [oxytetracycline]) when used in spray solution at rates to give approximately 250 and 500 p.p.m. streptomycin indicate that: (1) It is not detectable in the leaves of pepper plants but is detectable in the leaves of snapbean plants, indicating a varying host response. (2) It does not eradicate the causal organism of bacterial leaf spot of pepper (*Xanthomonas vesicatoria*) from established leaf lesions when used at concentrations as high as 500 p.p.m. (3) Its action is that of a bacteriostatic protectant when used at concentrations of 250 p.p.m. (4) It will reduce infection of pepper leaves by *X. vesicatoria* when used at frequent intervals at concentrations of 250 p.p.m. and higher. [Authors' summary.]—Del, agric. Exp. Stat.

4060. Singh, H. B., and Sikka, S. M.
These Pusa brinjals should interest you!
Indian Fmg, 1955, **5** (2): 18-21, illus.

Cultural notes are given on 2 new eggplant varieties selected at the Indian Agricultural Research Institute, namely, Pusa Purple Long and Pusa Purple Round, both of which are resistant to shoot-borer and to the little leaf virus.

4061. Dobroljubskiĭ, O. K.
The combined effect of some microelements on the flowering and fruiting of eggplant. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1955, **101:** 1135-7, bibl. 6.

Mn, Zn and Co suphates applied alone or in combination improved flowering, fruiting and earliness in eggplants as compared with the controls. The best results were obtained when Mn was applied alone, followed by Zn+Co and Zn+Mn+Co. Of the treatments used Zn+Mn was the least satisfactory.

4062. Plavšić-Gojković, N.
Jedna nova solanacea. **(A new solanaceous plant.)** [German summary, ¼ p.]
Poljopr. Znanst. Smot., 1953, **15** (1): 135-48, bibl. 5.

Information is given on *Solanum kaki*, sp. nov., an erect annual herb somewhat similar to the eggplant but with spherical fruit.

Sundry.

4063. Buell, E. P.
The star gooseberry as a leafy vegetable.
Trop. Agriculturist, 1954, **110:** 292-3.

The characters, culture and leaf analysis of *Sauropus albicans* are discussed. It is rich in vitamins A, B_1 and C.

4064. Hodge, W. H.
The Chinese waterchestnut.
Circ. U.S. Dep. Agric., **956**, 1955, pp. 16, illus.

Chinese waterchestnut is the common name for the tropical sedge *Eleocharis dulcis* (*E. tuberosa*), the corms of which are rated highly as a delicate food. Since imports from China became scarce, attempts have been made to establish this annual crop in the United States where it was found to thrive in the southern areas of the Atlantic Coastal Plain. The chief requirements of Chinese waterchestnuts are controlled irrigation (depth of water 5-10 in.) and a long frost-free growing season of approximately 220 days. Cultural practices, as evolved at the U.S. Barbour Lathrop Plant Introduction Garden, Savannah, Ga., are discussed.

Noted.

4065.

a Afanasjeva, A. S., Gluščenko, I. E., and Ellengorn, Ja, E.
The process of callus formation in tomatoes. [Russian.]
Izv. Akad. Nauk S.S.S.R., Ser. biol., 1955, No. 3, pp. 54-70, bibl. 36.

b Anon.
The cultivation of Globe artichokes.
Grower, 1955, **43:** 1263.
Recommended method for the U.K.

c Aoba, T.
On bulb formation and dormancy in onion. II. On process of bulb formation and development of scales. [Japanese with English summary ½ p.]
J. hort. Ass. Japan, 1955, **23:** 249-58, bibl. 12, illus.

d Banadyga, A. A., and others.
Cucumber production in North Carolina.
Ext. Circ. N.C. agric. Ext. Serv. **383,** 1954, pp. 19, illus.
An important outdoor crop.

e Banga, O.
Uienveredeling met gebruik making van inteelt en herstel door heterosis. **(Improvement of onions through inbreeding and recovery by heterosis.)** [English summary, ¼ p.]
Meded. Dir. Tuinb., 1955, **18:** 391-400, illus.

f Bogoljubova, V. G.
A case of seed germination and the appearance of green coloration in the cotyledons within a tomato fruit. [Russian.]
Bot. Žurnal, 1954, **39:** 908-10, illus.

g BOULD, C., NICHOLAS, D. J. D., AND THOMAS, W. D. E.
The effect of washing and a lead acetate soil treatment on the phosphorus content of barley and tomato roots.
Plant and Soil, 1955, **6:** 300-4, bibl. 4.

h BOYER, M. G.
Variation in the incidence of *Ascochyta pisi* in pea seed as influenced by treatment and media.
Plant Dis. Reptr, 1955, **39:** 475-6, bibl. 1.

i BRASHER, E. P.
Introducing Wiltmaster, a new processing variety of tomato for Delaware.
Bull. Del. agric. Exp. Stat., **310,** 1954, pp. 5, illus.
Resistant to the common races of *Fusarium* wilt.

j CROWDY, S. H., GROVE, J. F., AND PRAMER, D.
Systematic distribution of antibiotics and the control of plant diseases.
[*Proc.*] *Congr. int. Bot.*, Paris, 1954, pp. 88-90, bibl. 4.
Movement of griseofulvin, chloramphenicol, and streptomycin in *Vicia faba.*

k DAKSHINAMURTI, K.
Choline content of some South Indian foodstuffs.
Curr Sci., 1955, **24:** 194-5, bibl. 10.
Including plantain, eggplant, cabbage, tomato and onion.—Christian Medical Coll., Vellore, S. India.

l FERGUSON, A. C.
Onions in Colorado.
Mkt Grs J., 1955, **84** (6): 6, 8, illus.

m FULTON, H. G., AND HANDFORD, R. H.
The carrot rust fly in British Columbia.
Publ. Canada Dep. Agric., **939,** 1955, pp. 4.

n GIGANTE, R.
La maturazione a chiazze dei frutti di pomodoro. (**Blotchy ripening of tomato.**) [English summary, 8 lines.)
Bol. Staz. Pat. veg. Roma, 1954, **12:** 127-36, bibl. 6.
Describes the symptoms of this physiological disorder.

o GREEN, P. S.
Pollen grain size in *Nasturtium* and *Cakile*.
Trans. bot. Soc. Edinb., 1955, **36:** 289-304, bibl. 28.
Two watercress species.

p HORNE, F. R.
Winter cauliflower: history and breeding in the South West [of England].
Sci. Hort., 1952-54, **11:** 128-39, bibl. 8.
Selection and breeding at Seale-Hayne.

q HUTCHINS, A. E.
Gourd culture.
Minn. Hort., 1955, **83:** 58-9, 66, illus.
Cucurbita pepo var. *ovifera* and *Lagenaria* spp.

r JENKINS, W. F.
Post-harvest changes in refrigerated and non-refrigerated southern peas.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 327-30, bibl. 5.
See *H.A.*, 25: 601.

s KNEEBONE, L. R.
Composts for mushroom culture.
Mkt Grs J., 1955, **84** (6): 16-17, illus.
Including a synthetic compost from crushed corn cobs, hay and supplements.

t KNEEBONE, L. R.
Mushroom diseases, abnormalities, and their control.
Mkt Grs J., 1955, **84** (7): 14-16, 21, illus.

u KRASSOWSKA, W.
Czteroletnie doświadczenia odmianowe z fasolą. (**Four years' variety studies with dry beans.**) [English and Russian summaries, 1 p. each.]
Roczn. Nauk. rol., Ser. A, 1955, **70:** 415-29, bibl. 8.
In Poland.

v MCDANIEL, W. E.
Delaware's competitive position in the production of tomatoes for processing.
(*Tech.*) *Bull. Del. agric. Exp. Stat.*, **313,** 1955, pp. 34, bibl. 7.
Statistics and economics.

w MCNAUGHT, K. J.
Trace element deficiencies in market garden crops.
N.Z. J. Agric., 1955, **90:** 563-8, bibl. 2, illus.

x MARÍA DEL RIVERO, J.
El escarabajo del melon [*Epilachna chrysomelina*]. (**The melon beetle.**)
Hojas divulg. Minist. Agric. Madrid, **19-54-H,** 1954, pp. 8, illus.
Life history, injuries, control.

y MÜLLER, F. P.
Blattläuse in Mieten, Lagerräumen und Kellern. (**Aphids in clamps, storage sheds and cellars.**
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9:** 81-6, bibl. 23, illus.
Including *Rhopalosiphoninus staphyleae* on tulip bulbs and *Myzus ascalonicus* on onion bulbs.

z ODLAND, M. L., AND NOLL, C. J.
Vegetable variety trials 1954.
Progr. Rep. Pa agric. Exp. Stat., **132,** 1955, pp. 8.

4066.

a OLSSON, N., ÅKERBERG, E., AND BLIXT, B.
Investigations concerning formation, preservation and utilization of carotene.
Acta Agric. Scand., 1955, **5:** 113-84, bibl. 45.
In forage plants and carrots [see *H.A.*, 21: 622].

b PERRON, J. P., FINLAYSON, D. G., AND DUSTAN, A. G.
The onion maggot.
Publ. Sci. Serv. Ent. Div. Canada Dep. Agric. **935**, revised 1955, pp. 4.
Seed treatment with DDT or soil treatment with chlordane or aldrin.

c PERU MINISTRY OF AGRICULTURE.
The culture of bean along the Peruvian coast.
Agric. Res. News Notes Peru, 1954, **1** (2): 2.
Brief notes on culture and varieties of *Phaseolus vulgaris*.

d PHILIPP, F.
Ergebnisse der Frühgemüsesortenversuche 1954. **(Results of the 1954-trials of early vegetable varieties.)** [English, French, Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 116-44.
Radish, pea, kohlrabi, cabbage, cauliflower, carrot.

e PONNAIYA, B. W. X., AND RAO, T. B. K.
We have a new spinage for you.
Indian Fmg, 1955, 5 (1): 17, illus.
Brief notes on *Talinum triangulare*, the Ceylon spinach.

f QUANTZ, L.
Die Mosaikkrankheiten der Gartenbohne. **(The mosaic diseases of garden beans.)**
Gartenwelt, 1955, **55**: 181-2, illus.
Types and control.

g RAO, P. G., AND RAJU, D. G.
Wilt of *Talinum triangulare* Willd., caused by *Pythium aphanidermatum* (EDS.) Fitz.
Sci. and Cult., 1955, **20**: 502-3, bibl. 1.
T. triangulare is used as a green vegetable in India.

h REED, L. B., AND DOOLITTLE, S. P.
Insects and diseases of vegetables in the home garden.
Home and Garden Bull., U.S. Dep. Agric., **46**, 1955, pp. 64, illus., + 4 colour plates.
Including those of raspberry and strawberry.

i SALKELD, E. H.
Control of the carrot fly in Eastern Canada.
Pub. Sci. Serv., Ent. Div., Canada Dep. Agric. **941**, 1955, pp. 7, illus.

j SANGERS, W. J.
De geschiktheid van het Nederlandse klimaat voor groententeelt. **(The suitability of the climate of the Netherlands for vegetable growing.)** [English summary, 1 p.]
Meded. Dir. Tuinb., 1955, **18**: 159-86, 213-33.

k SHOLTO DOUGLAS, J. W. E. H.
Soilless cultivation of crops in India.
Nature, 1955, **175**: 884-5, bibl. 3.
See also *H.A.*, 25: 1275u.

l THOMPSON, A. E.
Inheritance of high total carotenoid pigments in tomato fruits.
Science, 1955, **121**: 896-7, bibl. 3.

m WALKOF, C.
Double backcrossing as a possible method of developing an early, large-fruited tomato.
Diss. Abstr., 1954, **14**: 1126, being *Publ.* 8496 of 74 pp.

n WILLIAMS, G. R.
Texas watermelons.
Mkt Grs J., 1955, **84** (7): 18-19, illus.
Varieties and culture.

o WISHART, R. L.
Early blight of tomatoes.
J. Dep. Agric. S. Aust., 1955, **58**: 375-8, illus.
Control of *Alternaria solani* under South Australian conditions. [See also *H.A.*, 24: 2820.]

p YAMAGUCHI, M., AND OTHERS
Nutrient composition of fresh and frozen Lima beans in relation to variety and maturity.
Food Res., 1954, **19**: 617-26, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 1950.

TOBACCO.

General.

(*See also* 3419, 3866, 3870, 3886, 4123a, g, 4469, 4473, 4478, 4487n.)

4067. ISTITUTO SCIENTIFICO SPERIMENTALE PER I TABACCHI.
Relazione tecnica 1954 **(1954 technical report [of the Tobacco Scientific Experiment Station].)**
Tabacco, 1955, **59**: 159-91.

Agronomy section. Chief types and varieties studied: Maryland, Burley, Kentucky, Virginia, subtropical, Turkish. Varietal trials, rotations, subsoiling, manuring, spacing, topping, shading, non-parasitic diseases. *Genetics and Physiology section.* Physiology: drought resistance, effect of topping on osmotic pressure and of sunlight and low temperature on flowering, effect on Virginia Bright of culture under maize and of MH treatment to inhibit axillary shoots; control of *Cyperus rotundus* with sodium phenoxydimethylenesulphonate. *Plant Pathology section.* Oidium, viruses especially mosaic resistance, wild fire, black root rot. *Entomology section.* Soil pests including nematodes, aphids and caterpillars, and fumigation of stores. *Chemistry section.* Biochemistry at various stages of growth and during curing, fermentation and storage. Chemical changes resulting from MH treatment. Burning qualities. Experiments on the rapid determination of moisture contents of tobacco. *Technology section.* Midrib incision as an aid to curing. Curing and fermentation including the curing of Turkish tobacco in air-conditioned chambers. Treatment of Brasile 11 with ascorbic acid to improve leaf harvested when not quite mature.

4068. Manuel Pillai, S. V.
The cultivation, curing and processing of bidi tobacco.
Trop. Agriculturist, 1954, **110:** 285-8, bibl. 1.

Ecology, varieties, culture, harvesting, curing and grading are discussed. Quality increases with increasing N up to 160 lb. N per acre given in the form of oilcake. Nicotine content increases with increasing N up to 80 lb. and then remains constant.

Breeding and varieties.

(*See also* 4123d.)

4069. Alcaraz Mira, E., and Caridad Igelmo, J. M.
Estudios genéticos sobre la combustibilidad del tabaco. **(Genetical studies on the burning qualities of tobacco.)** [English summary 5 pp.]
An. Inst. nac. Invest. agron. Madrid, 1954, **3** (4): 1-586, bibl. in text, illus.

Breeding was conducted in 1946/54 with Valencia and Maryland, the 2 types most commonly grown, and with exotic varieties and new hybrids with a view to improving the burning qualities of Spanish tobacco. Selected lines of the cross 246-XI (Valencia × Havana hybrid 20) had very good burning qualities and Sumatra also showed promise.

4070. de Jong, G. J.
Toetsproeven met nieuwe Keduvormen. **Tests with new Kedu tobacco varieties.)** [English and Indonesian summaries 13 lines each.]
Bergcultures, 1955, **24:** 279-83.

Four F_1 hybrids of crosses between Kedu and "Hybrid" strains were tested. These new varieties had longer and thinner leaves than the Kedu varieties. It is estimated that yields will be increased by 20-30%.—Proefstat C. P. V., Djember.

Sowing, planting and cultural treatments.

(*See also* 4121.)

4071. Muraoka, Y.
Studies on the germination of tobacco seed. 1. Physiological characters and their classification in the seed of the main varieties cultivated in Japan. [Japanese, with English summary 1 p.]
Bull. Hatano Tobacco Exp. Stat., 1952, No. 36, pp. 1-22, bibl. 17 [received 1955].

The results of studies under various conditions of temperature and light were as follows:—(1) Rate of germination was greatest under alternating temperatures of 20°C. for 18 hr. and 30°C. for 6 hr., was good under constant temperatures of 25 or 20°C., was reduced under constant temperatures of 30°C. or 15°C. and varied greatly between varieties, especially at high temperature (30°C.). (2) Under alternating temperatures all varieties tended to show a higher percentage germination in light than in darkness. Viability rates in darkness and at high temperatures were correlated. (3) The 37 varieties studied could be classified into 3 groups, namely, those showing the highest percentage germination in (a) light/low temperature, (b) dark/high temperature and (c) light/high temperature conditions.

4072. Fatus, G. K., and Temnov, A. M.
The use of high humus mountain soils for raising tobacco seedlings. [Russian.]
Tabak, 1955, **16** (2): 16-18.

Mountain chernozem soils with 7 to 9% humus content and mountain-meadow chernozem soils with 10 to 11% and occasionally 12-14% humus content mixed with river sand and used in frames without being sterilized produced a heavy crop of early and completely disease-free tobacco seedlings. The use of these soils is recommended for Central Asian and other mountainous tobacco areas.

4073. Čirkovskiĭ, V. I.
The effect of DDT dust on the germination of tobacco seeds. [Russian.]
Tabak, 1955, **16** (2): 22-3, bibl. 6.

Tobacco seed was treated with 1, 2, 3, 4, 5 and 100 g. of 5% DDT dust and then stored for 1 and 2 years. The treatment did not affect germination, either in the laboratory or in frames, and it is concluded that DDT can be safely used for the control of storage pests of tobacco seed.

4074. Davidenko, A. I.
The water regime of tobacco plants when spaced in groups on the square. [Russian.]
Tabak, 1955, **16** (2): 18-19.

Dense planting of tobacco plants in groups on the square increased their water content and reduced their dry matter content, i.e. quality. It is recommended that on fertile soils tobacco should be planted in groups at 70 × 85 cm. with 2 plants in the group 15 cm. apart.

4075. Angell, H. R., and Wark, D. C.
Blue mould of tobacco. 1. Weeds in relation to disease percentages in young transplants.
J. Aust. Inst. agric. Sci., 1955, **21:** 104-6.

Observations on young tobacco transplants showed that the percentage of plants with blue mould (*Peronospora tabacina*) was higher in rows that had been left un-hoed than in rows that had been hoed. The higher incidence was associated with the growth of weeds close to the tobacco plants. [Authors' summary.]—C.S.I.R.O., Canberra.

Nutrition.

(*See also* 3420, 4123i.)

4076. Anon.
Fertilizing flue-cured tobacco.
[*Publ.*] *Tob. Res. Bd Rhod. Nyasaland*, 1955, pp. 12.

Among points on which advice is given are fertilizers for seedbeds, fertilizer mixtures, and rates, methods and timing of applications for various soil types. Notes are included on the effect on plant growth and leaf quality of N, P, K, Mg and B.

4077. Stein, L. H., and Marais, J. S. C.
Fertilizer studies with tobacco plants using radiophosphorus—labelled superphosphate. Part II.*
S. Afr. industr. Chem., 1952, **6**: 147-50, bibl. 4.
Pearse, H. L., and Stein, L. H.
Idem. Part III.
Reprinted from *J. S. Afr. chem. Inst.*, 1953, **6** (2): 25-30, bibl. 2.

In Part II experiments are reported on the effect of successive applications of phosphatic fertilizer to tobacco plants on black noritic turf soil. It was evident that high applications of fertilizer did increase phosphate content and possibly yield, but that in the soil investigated the effect did not persist till the end of the season. Successive applications of fertilizer provided phosphate in a more readily available form but did not significantly affect total yield.

In Part III similar experiments are reported on 2 soil types. An 800 lb./morgen application of a 2N:12P:6K mixture was found to be adequate, and was considered better than 3 successive dressings of one-third this amount. Three dressings of 800 lb./morgen improved the uptake of phosphate only slightly.—Centr. Tob. Res. Stat., Kroondal, and Nat. chem. Res. Lab., C.S.I.R., Pretoria.

4078. Stein, L. H., and Pearse, H. L.
Fertilizer studies with tobacco plants using radiophosphorus—labelled superphosphate. Part IV.
Reprinted from *J. S. Afr. chem. Inst.*, 1954, **7** (2): 125-30, bibl. 8.

Further experiments on the utilization of added phosphate to tobacco are described. A 4N:12P:6K fertilizer mixture containing labelled superphosphate has been applied at three levels to a number of soils known to differ in their available phosphate content. In all cases addition of fertilizer results in increased uptake of fertilizer phosphate with the percentage recovery of applied phosphate remaining more or less constant. This recovery, however, varies from soil to soil. [Authors' summary.]—Nat. chem. Res. Lab., C.S.I.R., Pretoria, and Centr. Tob. Res. Stat., Rustenburg.

4079. McEvoy, E. T.
Interaction of sodium and potassium on growth and mineral content of flue-cured tobacco.
Canad. J. agric. Sci., 1955, **35**: 294-9, bibl. 6, illus.

An experiment with flue-cured tobacco grown in sand culture showed that sodium-potassium combinations in the nutrient supply had significant effects on yield and mineral content of the plants. The effect of variations in the K supply on yield was highly significant, that of Na was just below the level of significance. The Na × K interaction effect on yield was highly significant; at zero-K supply, yield increased with increased Na supply; but, at high-K supply, yield decreased with increased Na supply. [See also *H.A.*, 25: 3013.]. When K was deficient symptoms of K deficiency on the plants were reduced in severity by the addition of Na to the nutrient supply. It was indicated that, when K was deficient, Na partially supplemented or replaced K in the nutrition of the plants. Na and K accumulated in the plants in direct relation to the supply. K depressed the uptake of Na by the plant and the two elements had an additive effect in depressing the uptake of Ca, Mg and P. [Authors' abstract.]—Centr. exp. Fm, Ottawa.

4080. Takahashi, T., and Takeyama, M.
Studies on the potash nutrition of Yellow tobacco. (1) Effect of the quantity of nitrate and ammoniacal nitrogen upon potash deficiency, potash intake and the biochemical relations of the crop. (2) Effect of the ratio of nitrate and ammoniacal nitrogen in the nutrient solution upon uptake of potash and other elements.
Takahashi, T., and Yoshida, D.
Studies on the potash nutrition of Yellow tobacco. (3) Effect of nitrogen form and potash levels in the culture solution. [Japanese, with English summaries $1\frac{1}{2}$ pp., 6 lines, and $\frac{3}{4}$ p. respectively.]
Bull. Hatano Tobacco Exp. Stat., 1952, No. 36, pp. 78-101, bibl. 22, pp. 103-8, bibl. 4, and pp. 109-19, bibl. 8 [received 1955].

In sand culture experiments varying amounts of nitrate and ammonia N were given together with fixed amounts of K and other essential elements. A summary of the results is as follows: (1) NH_3-N resulted in very poor growth with severe K deficiency in the upper leaves and chlorosis of the lower leaves, but NO_3-N produced normal, vigorous growth even when the K:N ratio was low. (2) NO_3-N for the first half of the growing period, followed by NH_3-N for the second half, resulted in greater K deficiency at topping time than did NH_3-N supplied at both stages. (3) Leaf N was higher with NH_3-N and with NO_3-N followed by NH_3-N than with NO_3-N or with NH_3-N followed by NO_3-N, especially when high rates of N were supplied. (4) Leaf K was much lower with NH_3-N and with NO_3-N followed by NH_3-N than with NO_3-N, the upper leaves in particular showing severe deficiency symptoms. (5) Leaf Cl was higher with NH_3-N than with NO_3-N, especially in the upper leaves and when the N supply was low. (6) The reducing and total sugars contents of the upper leaves were higher and the starch and protein lower with NO_3-N alone than with NO_3-N followed by NH_3-N.

In general, uptake of K, Ca and Mg increased with increase in the NO_3:NH_3 ratio.

Studies on the effects of type of N and of K levels on growth, K content of leaf and ion absorption showed that: (1) NO_3-N produced much better growth than NH_3-N, K deficiency being evident with all K:NH_3 ratios and especially the lower ones. (2) P and Cl contents were higher in the NH_3-N series, and K, Ca and Mg contents were higher in the NO_3-N series, especially in the lower leaves. (3) An interrelationship between absorption of nitrate, ammonium, K, Ca, Mg, P and Cl ions was clearly detected. (4) K content increased and Ca and Mg decreased in both series with increasing K supply, especially in the upper leaves of the NO_3-N series. Cl but not P content increased with increasing K supply in both series.

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* For Part I see *H.A.*, 22: 4032.

4081. Takahashi, T., and Yoshida, D.
Studies on the potassium nutrition of Yellow tobacco. (4) Growth, yield, development of potassium deficiency and chemical composition of the tobacco plant in relation to the period of potassium supply. [Japanese, with English summary ¾ p.]
Bull. Hatano Tobacco Exp. Stat., 1954, No. 38, pp. 18, bibl. 8, illus.

The results of water culture experiments on Bright Yellow tobacco were as follows: (1) Supplying K for the first 55 days after transplanting, i.e. up to flowering, resulted in the maximum leaf yield. (2) The earlier K supply was stopped during the vigorous growth stage before flowering, the lower was the dry matter yield. (3) With high K supply deficiency symptoms were not detected when the supply continued till flowering, but the earlier the supply was stopped before flowering the more evident were the K deficiency symptoms. (4) With no K supply the period of deficiency lasted longer, the symptoms were more severe and the yield was lower. (5) K absorption was 5815 mg. per plant when the element was supplied throughout the whole growth period, 3069 mg. in the plot which gave the highest dry matter yield, and much lower when the supply was stopped 40 days after transplanting during the vigorous growth stage. (6) Rate of K absorption was higher when the K supply was continuous than when it was stopped early. (7) Withholding K during the vigorous growth stage, 30-40 days after transplanting, increased the N content and decreased the nicotine content of the upper leaves.

Quality, physiology and composition.

(*See also* 4123c, h, i.)

4082. Akaike, S.
Studies on the physical and chemical factors affecting the quality of leaf tobacco. I. Preliminary studies. II (1). On the relation of the specific conductivity to the quality of leaf tobacco. [Japanese, with English summaries, ½ and 1½ pp.]
Bull. Hatano Tobacco Exp. Stat., 1952, No. 36, pp. 57-62, bibl. 11, and pp. 63-75, bibl. 4 [received 1955].

Quality in the cutter leaf grades of Yellow tobacco is closely correlated with specific conductivity and alkalinity, especially the former, and power to reduce Fehling's solution is a good index of aroma and taste. The specific conductivity of leaf tobacco is greatly affected by the type of N fertilizer used, and is lower in topped than in untopped plants, in the upper than in the lower leaves of topped plants, and in the middle than in the upper or lower leaves of untopped plants. Glowing capacity decreases from the tip to the base of the leaf, that of the tip being double that of the base.

4083. Okuma, K.
Studies on the grading of leaf tobacco. 1. On the colour of various Bright leaf tobaccos possessing high quality. [Japanese, with English summary 6 lines.]
Bull. Hatano Tobacco Exp. Stat., 1952, No. 36, pp. 43-55, bibl. 2 [received 1955].

Spectro-reflection studies showed that quality in Bright leaf tobacco is closely related to the dominant wave-length of the colour of the upper surface and, to some extent, to the purity of the colour of both surfaces.

4084. Okuma, K., Nomura, Y., and Suyama, I.
Experiments on change of colour of tobacco leaves cured by the flue-curing method. [Japanese, with English summary ½ p.]
Okuma, K.
Experiments on change of colour of leaves of Bright tobacco. [Japanese, with English summary 1 p.]
Spec. Bull. Hatano Tobacco Exp. Stat., **1**, 1952, pp. 7, bibl. 2, and **4**, 1954, pp. 14.

Colour changes in Bright Yellow upper leaves were measured during maturation, curing and storage. Reflection of light of 500-600 mμ increased greatly during maturation, continued to increase during curing (when reflection of light of over 600 mμ also increased) and decreased during storage. Luminosity, dominant wave-length and purity of colour were all low at the beginning of maturation and increased greatly until the beginning of curing. Luminosity continued to increase during curing but fell during storage. Dominant wave-length continued to increase throughout curing and storage. Colour purity decreased during curing and increased during storage.
Further information on colour in upper and lower leaves is given in the second paper.

4085. Vickery, H. B.
The metabolism of the organic acids of tobacco leaves. VIII. Effect of culture of excised leaves in solutions of L-malate at pH 4 to pH 7.
J. biol. Chem., 1955, **214**: 323-33, bibl. 10.

Excised leaves of tobacco (*Nicotiana tabacum* var. Connecticut shade-grown), when cultured in 0·2 M solutions of potassium L-malate, take up more malic acid from a solution adjusted to pH 4 than from a solution at pH 6 or 7; furthermore, a larger proportion of the acquired malic acid is metabolized at low than at neutral pH. On the other hand, the stimulation of the formation of citric acid is greater at the higher pH. [From author's summary.]—Conn. agric. Exp. Stat., New Haven.

4086. Nakai, T.
Fundamental studies on the tobacco enzymes. [Japanese, with English summary 1½ p.]
Bull. Hatano Tobacco Exp. Stat., 1952, No. 36, pp. 121-37, bibl. 13 [received 1955].

The results of studies on enzyme activity in leaf tobacco were as follows: (1) Amylase and peroxidase activity increased gradually with growth but was temporarily reduced after topping. (2) Invertase activity increased gradually from 50 days after transplanting until topping and then decreased gradually. (3) Catalase activity decreased gradually with growth. (4) Enzyme activity, especially that of amylase, increased temporarily in plants suffering from disease, poor nutrition or lack of moisture. (5) Before maturation the activity of amylase and invertase was greatest at 10 a.m., that of catalase at 2 p.m. and that of peroxidase at 6 p.m. (6) The activity of amylase and peroxidase was greater in the lower leaves and that of invertase and catalase in the upper leaves. (7) The activity of amylase, invertase and peroxidase was temporarily reduced by topping but was greater in topped than in untopped plants during maturation, while that of catalase was constantly greater in untopped than in topped plants. (8) During maturation the activity of amylase and invertase was greatest at midnight and least at 1 p.m., that of catalase was greatest at 6 a.m. and gradually decreased, and that of peroxidase was least at 6 a.m. and gradually increased. (9) The more mature the leaf the greater was the activity of amylase and peroxidase and the less the activity of invertase and catalase. (10) After flue-curing amylase activity was much greater than, invertase activity the same as, and catalase and peroxidase activity slightly less than before curing.

4087. SCARASCIA VENEZIAN, M. E.
Osservazioni enzimatiche su *Nicotiana glauca* e sul suo autotetraploide *N. diglauca*. **(Notes on enzyme activity in *Nicotiana glauca* and its autotetraploid *N. diglauca*).** [English summary 8 lines.]
Ann. Sper. agrar., 1955, **9:** 661-5, bibl. 9.

Catalase, polyphenoloxydase and carbonic anhydrase activities in the seed and leaf were, in general, greater in the diploid than in the tetraploid. Polyphenoloxydase activity in the diploid leaf was nearly double that in the tetraploid leaf.

4088. BOLSUNOV, I.
Influences des conditions météorologiques sur le taux de nicotine dans les feuilles de tabac. **(Effects of weather conditions on the nicotine content of tobacco leaf.)**
Rev. int. Tabacs, 1955, **30:** 99.

Experiments at the Austrian National Tobacco Breeding Station at Fürstenfeld and elsewhere in 1949-54 show that the following factors increase nicotine content: dry soil due to dry weather; high osmotic pressure of soil water; hot, dry summers; low, early topping; high soil nitrogen; wide spacing; and full maturity or over-maturity on harvesting. Figures are given for 5 varieties.

4089. FRANKENBURG, W. G.
Nicotine degradation *in vitro* induced by agents from tobacco seed.
Nature, 1955, **175:** 945-6, bibl. 3.

Two agents contained in the washings of tobacco seed-microorganisms and a heat resistant substance or substances were found to induce nicotine degradation *in vitro*. The author comments: " Considering the possibility that a reversal of the observed degradation reactions may occur in the presence of a reducing enzyme system and of hydrogen donors, such nicotine formation from simple compounds may represent a model of the natural nicotine synthesis in the tips of the rootlets emitted from the sprouting tobacco seed."

4090. BOSE, B. C., DE, H. N., AND DALAL, I. H.
Micro-method for estimation of nicotine group of alkaloids in tobacco plants.
Curr. Sci., 1955, **24:** 196, bibl. 2.

The method is based on the cyanogen bromide and aniline colour reaction as applied in nicotinic acid estimation by Swaminathan (*Ind. med. Res.*, 1942, **30:** 397) and Melnick (*Cereal Chem.*, 1942, **19:** 543).—M.G.M. med. Coll., Indore.

4091. EDDY, C. R., AND EISNER, A.
Infrared spectra of nicotine and some of its derivatives.
Analyt. Chem., 1954, **26:** 1428-31, bibl. 11.

The infrared spectra of nicotine and 5 related tobacco alkaloids are presented. Although the ultraviolet spectra cannot be used to distinguish the various alkaloids possessing equivalent degrees of conjugated unsaturation, the infrared spectra are distinctive and allow unambiguous identification of any one of these alkaloids. In particular, nicotine and nornicotine, whose ultraviolet spectra are essentially identical, show pronounced differences in the infrared.—U.S. Dep. Agric., Philadelphia.

4092. AKAIKE, S.
Isolation of some coumarin, polyphenolic and new nicotine compounds from yellow leaf tobacco. [Japanese, with English summary ½ p.]
Spec. Bull. Hatano Tobacco Exp. Stat., **7,** 1955, pp. 15, bibl. 24.

The substances are rutin, scopoletin, caffeic acid and 2 new nicotine compounds containing 18·73 and 13·25% nicotine respectively.

4093. CHAKRABORTY, S. R., AND CHAKRABARTY, M. M.
The variation in composition of Indian tobacco seed oils.
Sci. and Cult., 1955, **20:** 555-6, bibl. 7.

Spectrophotometric analyses of 15 specimens of about a dozen varieties from 6 localities are presented and discussed. In general the relatively slight variations found in the composition of the seed oils appeared to be due more to environment than to variety.—Presidency Coll. and Univ. Coll. Tech., Calcutta.

Diseases.

(*See also* 3956, 4075, 4123b.)

4094. NAKAMURA, H.
List of tobacco diseases in Japan. [In English.]
Bull. Hatano Tobacco Exp. Stat., 1952, No. 36, pp. 159-64 [received 1955].

A useful list is presented of the diseases and disorders which affect tobacco in Japan during growth, processing and storage. Japanese names are also given in many cases.

4095. STEPHEN, R. C.
Control measures for tobacco diseases.
Interim Rep. Tob. Res. Bd Rhod. Nyasaland, **4,** 1955, pp. 24, illus.

Information, drawn mainly from overseas sources, is given on fungal, bacterial and non-parasitic diseases in seedbed, field and curing barn.

4096. OWEN, P. C.
The respiration of tobacco leaves after systemic infection with tobacco mosaic virus.
Ann. appl. Biol., 1955, **43:** 265-72, bibl. 3.

The rate of CO_2 production per g. dry matter of the younger leaves of tobacco plants systemically infected with tobacco mosaic virus was about 10% less than that of comparable healthy leaves. Older infected leaves, showing well-developed mosaic symptoms, had the same respiration rate as comparable healthy leaves. These results were independent of seasonal change in light conditions during the growth of the plants. Older leaves, but not younger leaves, of infected plants had a lower initial water content, and both absorbed less water during the experimental period, than leaves from healthy plants. The effects of TMV infection on water content were so great that the rate of CO_2 production per g. fresh weight was sometimes significantly increased by infection. This reversal of the apparent effect of infection on respiration rate, depending on the basis of reference may partly account for contradictory results reported previously by other workers. Other causes for contradictory results are discussed. [Author's summary.]—Rothamsted exp. Stat., Harpenden.

4097. (OWEN, P. C.)
Effect of infection with tobacco mosaic virus on the respiration rate of tobacco leaves.
A. R. Rothamsted exp. Stat. 1954, p. 71.

Experiments have shown that the respiration rate of TMV-infected tobacco leaves can be higher or lower than, or identical with, that of healthy leaves, depending on the time since inoculation, environment during growth, the age of the plants and development stage of selected leaves and the basis of expression of the results.

4098. GONDO, M.
Respiration of virus diseased tobacco plant. II. [Japanese, with English summary 8 lines.]
Bull. Fac. Agric. Kagoshima Univ., 1954, **3:** 25-7, bibl. 7.

The respiration index of leaves of cucumber-mosaic-diseased tobacco plants grown in sand culture exceeded that of healthy plants throughout the growth cycle. Respiration tended to decrease as the leaves grew, especially in diseased plants. [For Part I see *H.A.*, 23: 3228.]

4099. RICH, A., DUNITZ, J. D., AND NEWMARK, P.
Abnormal protein associated with tobacco mosaic virus. Structure of polymerized tobacco plant protein and tobacco mosaic virus.
Nature, 1955, **175:** 1074-5, bibl. 10.

There can be isolated from TMV-infected tobacco leaves an abnormal protein which is non-infectious, free from ribonucleic acid and immunologically related to the protein component of the virus, and which polymerizes into rod-like structures. X-ray diffraction studies are reported which demonstrate the essential similarity between the configuration of the polymerized abnormal protein of the infected tobacco plant and the virus itself. Small differences are observed in the diffraction patterns, which suggest that it may be possible to determine accurately the position of the ribonucleic acid in the virus.

4100. CHESSIN, M., AND SCOTT, H. A.
Calcium deficiency and infection of *Nicotiana glutinosa* by tobacco mosaic virus.
Phytopathology, 1955, **45:** 288-9, bibl. 3.

Calcium deficiency consistently and markedly reduced the number of local lesions on inoculated plants.

4101. HIDAKA, Z.
Studies on tobacco mosaic disease. I. Some experiments on transmission. II. Virus movement in plants. [Japanese, with English summaries ¾ p. each.]
Bull. Hatano Tobacco Exp. Stat., 1951, No. 35, pp. 40-9, bibl. 5, and pp. 50-60, bibl. 5, illus. [received 1955].

Subjects studied were transmission by rain and wind, longevity in the soil and movement from an inoculated leaf and from a stem inoculated near its base.

4102. CROWLEY, N. C.
The effect of seed extracts on the infectivity of plant viruses and its bearing on seed transmission.
Aust. J. biol. Sci., 1955, **8:** 56-67, bibl. 11.

Experiments at the Waite Agricultural Research Institute have demonstrated the presence of an inhibitor of cucumber mosaic virus in the seeds of cucumber, and of tobacco mosaic virus in the seeds of tobacco. Both the inhibitors are proteins. Six separate lines of evidence indicate that the action of these substances is to inhibit infection by the viruses rather than to inactivate them. Theories advanced to explain the rarity of seed transmission of plant virus diseases are discussed in the light of these results.

4103. NOUR-ELDIN, F.
The effect of organic acids on tobacco mosaic virus multiplication.
Phytopathology, 1955, **45:** 291, bibl. 3.

The organic acids studied caused the following percentage increases in multiplication of TMV in Turkish tobacco leaf discs: citric 17-23, α-ketoglutaric 14-17, succinic 17-24 and malic 27-31.

4104. HARRIS, J. I., AND KNIGHT, C. A.
Studies on the action of carboxypeptidase on tobacco mosaic virus.
J. biol. Chem., 1955, **214:** 215-30, bibl. 27, illus.

The nature of the enzyme-virus reaction, the origin of the liberated threonine, the properties of the enzyme-treated virus and the reaction of the enzyme with sonic-treated virus are discussed.—Dep. Biochem. and Virus Lab., Univ. Calif., Berkeley.

4105. KNIGHT, C. A.
The action of carboxypeptidase on strains of tobacco mosaic virus.
J. biol. Chem., 1955, **214:** 231-7, bibl. 14.

Essentially the same quantity of threonine, and nothing but threonine, was split from each of 13 distinctive strains of tobacco mosaic virus treated with carboxypeptidase.—Virus Lab., Univ. Calif., Berkeley.

4106. HITIER, H., AND IZARD, C.
Experimentation d'antibiotiques dans la lutte contre le feu sauvage du tabac (*Pseudomonas tabaci*). **(Experiments with antibiotics for the control of tobacco wildfire.)**
[*Proc.*] *Congr. int. Bot.*, Paris, 1954, pp. 83-4.

Comparative tests with dihydrostreptomycin sulphate and copper oxide were carried out to determine their effect on *Pseudomonas tabaci*. Solutions were added to bacterial cultures for 5, 15 or 30 minutes, and the liquid was then transferred to a nutrient substrate. The copper oxide solution, at 10^{-3} Cu, was efficient at all lengths of treatment; weaker concentrations were more effective with longer treatment. Under these conditions, a 10^{-5} concentration of streptomycin was most satisfactory, and duration of treatment was not important. In tests with inoculated seedlings, preventive sprays applied 12 hours before inoculation were more effective in all cases than when applied 3 days after inoculation. Streptomycin was more active than copper oxide, and concentrations of 10^{-4} and 10^{-5} appeared to be sufficient in most cases. Concentrations of 10^{-3} caused some chlorosis of young leaves.—Inst. exp. tabac, Bergerac.

4107. HIDAKA, Z., AND SHIMIZU, T.
The use of chloropicrin for soil treatment against soil-borne plant pathogens. [Japanese, with English summary 1¼ p.]
Bull. Hatano Tobacco Exp. Stat., 1951, No. 37, pp. 1-23, bibl. 16, illus. [received 1955].

Applied at 2 c.c. per 4·5 sq. ft. before planting tobacco, chloropicrin (1) gave good but not complete control of bacterial wilt (*Bacterium* [*Pseudomonas*] *solanacearum*) in a heavily infected field and resulted in a normal yield; (2) controlled *Heterodera marioni* and moles; and (3) stopped the decline in yield due to continuous cultivation. Chloropicrin also gave some control of black shank (*Phytophthora nicotianae*) and other seed-bed diseases.

4108. HIDAKA, Z.
Studies on soil sterilization with chloropicrin. I. Control of tobacco wilt and manurial effect. [Japanese, with English summary ¾ p.]
Bull. Hatano Tobacco Exp. Stat., 1951, No. 35, pp. 11-27, bibl. 17, illus. [received 1955].

Chloropicrin applied at the rate of 2 c.c. per planting hole 3-4 days before setting out tobacco plants, 30% of which were infected with bacterial wilt, gave good control and resulted in a yield only 20% below normal. Virtually complete control of wilt was obtained with 5 c.c. chloropicrin per plant. Chloropicrin sterilization produced better growth by increasing the availability of ammonia nitrogen.

4109. HIDAKA, Z., YUKIHARU, —., AND SEKIYA, T.
Effect of chloropicrin sterilization of the soil upon the habit, moisture content and intercellular spaces of the tobacco plant. [Japanese, with English summary 1¼ p.]
Bull. Hatano Tobacco Exp. Stat., 1951, No. 37, pp. 43-56, bibl. 5, diagrams [received 1955].

Studies were made on the influence of chloropicrin sterilization of the soil on plant form, thickness of leaves, thickness of palisade and spongy tissues, number of cells per unit width of leaf in palisade tissue, size of midrib, and dry matter percentage in the leaf.

4110. HIDAKA, Z., SHIMIZU, T., AND FURUTA, Y.
Effect of chloropicrin sterilization of the soil upon the yield and quality of tobacco and other crops. [Japanese, with English summary ½ p.]
Bull. Hatano Tobacco Exp. Stat., 1951, No. 37, pp. 57-73, bibl. 7, illus. [received 1955].

In treated soil tobacco plants made more rapid early growth, flowered and matured their leaves earlier, and gave a larger and, in general, a better-quality yield.

4111. STEPHEN, R. C.
Frog eye and barn spot.
Bull. Tob. Res. Bd Rhod. Nyasaland, **4**, 1955, pp. 36, bibl. 29, illus.

Frog eye (*Cercospora nicotianae*) was studied in the seedbed, the field and the barn (barn spot) and control recommendations are made. Varietal differences are small, Delcrest being the least susceptible.

4112. STEPHEN, R. C.
Frog eye and barn spot disease of tobacco.
S. Afr. J. Sci., 1955, **51**: 298-300, bibl. 5.

The relation between cercospora leaf-spot of tobacco (*Cercospora nicotianae* Ell. and Ev.) in the field and during curing is examined. Yellowing at 100°F. and with 100% humidity gives considerably less spot than at 90°F. with 85% humidity, the factors being independent. With barn spot controlled by the higher yellowing temperature and humidity, nitrogen supply in the field is inversely related to spot production; the relationship is direct when barn spot development proceeds unchecked. [Author's abstract.]—Tobacco Res. Bd S. Rhod., Salisbury.

4113. RILEY, E. A.
Tobacco anthracnose—III: Experiments on fungicidal control of the disease.*
Trop. Agriculture Trin., 1955, **32**: 201-6, bibl. 3.

The thiocarbamates were superior to copper, mercury and sulphur compounds for soil disinfection [against *Colletotrichum tabacum*] and to bordeaux mixture as sprays but showed some phytotoxicity, especially thiram and ziram. Good control and protection from infection were achieved in the field with zineb used both as a soil disinfectant and protective spray. [From author's summary.]—Dep. Agric. N. Rhod.

4114. (ANDES, J. O.)
Tobacco anthracnose in Tenn.
From abstr. in *Agric. Chemls*, 1955, **10** (8): 62-3.

Excessive rains and cool nights have caused tobacco anthracnose to spread from the seedbed to the field for the first time in Tennessee. In the field the disease can cause stem cankers that kill the plants or distort buds and leaves. All kinds of tobacco are susceptible. It is recommended that when anthracnose is found in the field the land should be rested for at least a year. The disease can be spread by various means.

4115. MOORE, E. L., DROLSOM, P. N., AND CLAYTON, E. E.
High black shank resistance and tolerance to parasitic nematodes in flue-cured tobacco.
From abstr. in *Phytopathology*, 1955, **45**: 349.

Dixie Bright 101 and 102 were resistant to black shank (*Phytophthora* spp.). Hicks was among varieties resistant to *Tylenchorhynchus claytoni*, *Meloidogyne* sp. and *Pratylenchus sp.*

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* For Parts I and II see *H.A.*, **25**: 728 and 3018.

4116. Berbeć, J., and Berezowski, B.
Badania nad możliwością zastosowania niektórych zabiegów chemicznych i agrotechnicznych przy zwalczaniu chorób tytoniu w warunkach naszego kraju. Puławy 1950-1952 r. **(Studies on the possibility of applying certain chemical and agrotechnical measures for combating tobacco diseases. Pulawy 1950-1952.)** [English and Russian summaries ½ p. each.]
Roczn. Nauk roln., Ser. A, 1955, **70:** 431-41, bibl. 6.

Under Polish climatic and soil conditions treatment of the roots of tobacco transplants with 1% bordeaux cannot be recommended, as the slight decrease in soil-borne infections obtained is counterbalanced by an adverse effect of the treatment on establishment. A 2-day delay in planting out after removal from the frames, to allow root injuries to heal, was found to reduce the incidence of black root rot without affecting establishment.

Nematode and insect pests.

(*See also* 4115, 4123e, f.)

4117. Kring, J. B.
Control of some tobacco pests.
Circ. Conn. agric. Exp. Stat., **191,** 1955, pp. 15, bibl. 6, illus.

This circular supplements the information previously published [see *H.A.*, 21: 2779]. It discusses the toxicity to tobacco of some of the chlorinated hydrocarbons and the control of cutworms and wireworms with these insecticides and of aphids with organic phosphates.

4118. Graham, T. W.
Pathogenicity of *Rotylenchus brachyurus* on tobacco and *Criconemoides* sp. on tobacco and peanuts.
From abstr. in *Phytopathology*, 1955, **45:** 347.

Both nematodes reduced tobacco growth and yield in greenhouse tests. In field tests *Rotylenchus* reduced growth but not yield.

4119. Nusbaum, C. J.
Variable effects of nematocides on parasitic nematode populations in row-fumigated tobacco plots.
From abstr. in *Phytopathology*, 1955, **45:** 349.

In North Carolina in 1954 D-D and 2 EDB formulations applied with gravity equipment generally gave satisfactory control of *Meloidogyne* spp., D-D being superior on coarse sandy soils. Both EDB formulations markedly reduced populations of *Tylenchorhynchus claytoni* and virtually eliminated *Helicotylenchus* spp. and *Xiphinema americanum*, but were much less effective than D-D against *Pratylenchus* spp. D-D was less effective than EDB against *Tylenchorhynchus claytoni*.

4120. Nusbaum, C. J., and Sasser, J. N.
Comparison of Dowfume W-85 and D-D mixture applied as liquids and impregnated on vermiculite for nematode control.
From abstr. in *Phytopathology*, 1955, **45:** 349-50.

In general, D-D and EDB impregnated on vermiculite both gave slightly better control of root knot nematodes on tobacco than comparable liquid applications.

4121. Zigaev, G. N.
Accelerated forcing of *Nicotiana rustica* seedlings resistant to tobacco thrips. [Russian.]
Tabak, 1955, **16** (2): 21-2.

Tobacco seed treated with 12% BHC dust produced earlier and more vigorous seedlings than untreated seed. In the field infestation of plants raised from treated seed by the larvae of tobacco thrips [*Thrips tabaci*] was only a quarter of that observed on the control plants. Infestation by adult thrips was about the same whether seed was treated or not.

4122. Gruševoĭ, S. E., and Šlenkšo, S. I.
Aerial spraying of *Nicotiana rustica* with DDT suspensions. [Russian.]
Tabak, 1955, **16** (2): 24-5.

Data are presented showing that suspensions of 5·5% DDT dust applied at 10 kg. per ha. in 100 l. water before, and at 15 kg. per ha. after, bud formation gave very satisfactory control of tobacco thrips [*Thrips tabaci*]. To obtain comparable results with dry dust 23-30 kg. of DDT per ha. were required. Spraying by aeroplane takes longer than dusting but is not so dependent on calm weather.

Noted.

4123.

a Akaike, S.
On the green pigments isolated from "Aogeji" spots (green spots) on air-cured leaf tobacco. [Japanese, with English summary, 4 lines.]
Spec. Bull. Hatano Tobacco Exp. Stat., **5,** 1955, pp. 6, bibl. 6.
Two green pigments isolated proved to be chlorophyll a and b.

b Bartels, W.
Der gegenwärtige Stand der Forschung auf dem Gebiet der Inaktivierung pflanzenpathogener Viren, insbesondere des Tabakmosaikvirus. **(The present state of research on the inactication of plant pathogenic viruses, with special reference to tobacco mosaic virus.)**
Phytopath. Z., 1955, **24:** 117-78, bibl. 101.

c French, D.
Isolation and identification of planteose from tobacco seeds.
J. Amer. chem. Soc., 1955, **77:** 1024-5, bibl. 7.

d Heggestad, H. E.
Burley, flue-cured and cigar-wrapper tobacco varieties compared for resistance to black shank and *Fusarium* wilt.
From abstr. in *Phytopathology*, 1955, **45:** 348.
Notes on the new varieties, Burley 11A and 11B.

e McClanahan, R. J.
Control of hornworms on tobacco.
Publ. Canada Dep. Agric., **951**, 1955, pp. 2. illus.
By DDD or endrin.

f Mountain, W. B., and Koch, L. W.
Nematode diseases of tobacco in Ontario.
Rev. int. Tabacs, 1955, **30**: 107-8, bibl. 3.
Species and brief outline of control.

g Ortiz R., G.
El cultivo de tabaco en el departmento de Bolivar. (**Tobacco grwoing in the district of Bolivar, Colombia.**)
Agric. trop. Bogotá, 1955, **11**: 49-56, 169-75, illus.
Area, production, exports, varieties, cultural practices, yields.

h Scarascia, G. T.
Effetti citologici di estratti acquosi di semi di *N. rustica*. (**The cytological effects of aqueous extracts of seed of *Nicotiana rustica*.**) [English summary 14 lines.]
Tabacco, 1955, **59**: 201-8, bibl. 10, illus.
On the root meristem of onions. [See also *H.A.*, 24: 4003c.]

i Takahashi, T., and Yoshida, D.
Flame-photometric determination of potassium. [Japanese, with English summary ¾ p.]
Flame-photometric determination of calcium. [Japanese, with English summary ½ p.]
Spec. Bull. Hatano Tobacco Exp. Stat., **2**, 1952, pp. 12, bibl. 6, illus., and **3**, 1954, pp. 8, bibl. 6 [received 1955].
In tobacco plant material.

j Tanaka, M.
Leaf hairs in *Nicotiana*. [Japanese, with English summary 1¼ p.]
Spec. Bull. Hatano Tobacco Exp. Stat., **6**, 1955, pp. 22, bibl. 7, illus.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

General.

(*See also* 4172m, 4469.)

4124. Hodge, W. H.
Some new or noteworthy industrial raw materials of plant origin.
Econ. Bot., 1955, **9**: 99-107, bibl. 38.

In this selective review of surveys made by the Georgia Institute of Technology, attention is drawn to some new or as yet little-exploited sources of fats, oils, waxes, gums, resins and oleoresins that may some day become important supplements to the longer established sources of these industrially valuable plant extractives. [Author's note.]

Culinary and spice plants.

(*See also* 4172g, l, 4269p.)

4125. Rao, U. N.
Research shows new ways to bigger cardamom yields.
Indian Fmg, 1955, **5** (3): 11-12.

The 2 most important cardamoms cultivated in Madras are a large-podded type and a small-podded type differing in flower characters. The former is susceptible to thrips but resistant to mosaic, and the reverse is the case with the latter. Two selected varieties, S.81, which is suitable for heavy-rainfall areas, and S.71 give five times the yield of unselected varieties. Advice is given on nursery practice and the control of thrips and *Pythium* sp.

4126. Marinet, J.
Étude économique et culturale du poivre au Cambodge. (**An economic and cultural study of black pepper in Cambodia.**) [English and Spanish summaries ½ p. each.]
Agron. trop., 1955, **10**: 279-360, bibl. 14, illus.

A description of the traditional Indo-Chinese method of growing *Piper nigrum* is followed by an account of the factors affecting production and advice on the establishment of a pepper plantation. Subjects covered are soil, climate, clearing and preparation of site, varieties, propagation (by cuttings, seed and grafting), planting of cuttings, live and dead supports, cultural work (including training, shading and manuring), control of diseases and pests, life cycle, harvesting, the different kinds of pepper, processing, grading and economics.

4127. Cooper, St. G. C.
A rapid method of propagating black pepper.
Trop. Agriculture Trin., 1955, **32**: 207-9, illus.

Leaf cuttings of *Piper nigrum* with petiole and bud attached quick-dipped in indolebutyric acid at 2 mg. per ml. of 50% alcohol gave 75% rooting in 21 days in a standard cacao propagator with coir dust as the medium. The plants were hardened off for only 7 days and were ready for the field 3 months after potting. Preliminary observations on trials with supports, both living and dead, suggest that the calabash, *Crescentia cujete*, is particularly suitable.—Trinidad Dep. Agric.

Drug plants.

(*See also* 3498k, 4172 a, c, g, k, 4269p, 4448, 4473.)

4128. Petelot, A.
Les plantes médicinales du Cambodge, du Laos et du Viêtnam. Tome IV. Tables. (**Medicinal plants of Cambodia, Laos and Viêtnam. Vol. IV. Tables.**)
Arch. Rech. agron. pastor. Viêtnam, **23**, 1954, pp. 307.

This volume consists of indexes of the medicinal plants of Indo-China under their therapeutic properties, the diseases for which they provide remedies, and their scientific, French and foreign common, and vernacular names.

4129. Wall, M. E., and others
Steroidal sapogenins. XII. Survey of plants for steroidal sapogenins and other constituents.
J. Amer. pharm. Ass. sci. Ed., 1954, **43:** 503-5, from abstr. in *Biol. Abstr. Sect. D.*, 1955, **29**, No. 14724, and abstr. in *[Publ.] U.S. Dep. Agric.*, **ARS-73-6,** 1955, No. 892.
Idem. XV. Supplementary table of data for steroidal saponins XII.
[Publ.] U.S. Dep. Agric., **AIC-367,** 1954, from abstr. in *[Publ.] U.S. Dep. Agric.*, **ARS-73-6,** 1955, No. 893.

A report of the chemical examination of the second 1000 samples received in a survey of plants for steroidal sapogenins. Data are given for 997 samples, representing 598 identified species, 201 unidentified lots, 392 genera, and 129 families. There is no previously published chemical information on about 60% of the species examined. Quantitative data are given for the occurrence of 11 steroidal sapogenins. These were found almost exclusively in *Yucca*, *Agave*, and *Dioscorea*. A new sapogenin, named markogenin, was found in *Y. schidigera*. Qualitative data are given for the occurrence of the following groups of constituents: flavonols, alkaloids, tannins, and unsaturated sterols. [Authors' abstract.]—U.S. Dep. Agric., Philadelphia.

4130. Willaman, J. J., and Schubert, B. G.
Alkaloid hunting.
Econ. Bot., 1955, **9:** 141-50, bibl. 32.

By the end of 1952 some 950 alkaloids had been isolated from plants and named, and in most cases their structure determined. These have been found in 98 families, 537 genera and 1,200 species. A table of the 235 major plant families is given, showing for each the total number of species and the number of species on which there is alkaloid information, either for its presence or absence. [From authors' summary.]—Agric. Res. Serv., U.S. Dep. Agric.

4131. Bottomley, W., and Mortimer, P. I.
Variation in the main alkaloids of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell. I. Chemical methods.
Aust. J. appl. Sci., 1954, **5:** 255-7, from abstr. in *Biol. Abstr. Sect. D.*, 1955, **29,** No. 14717.

Methods are described for the extraction of the bases from the leaves of *Duboisia myoporoides* R. Br. and *D. leichhardtii* F. Muell., and for the separation, estimation and identification of the principal alkaloids, based on the partition chromatographic procedure of Evans and Partridge (1948). [Authors' summary.]—[For parts II to V, see *H.A.*, 25: 3032-3035.

4132. Feuell, A. J.
The genus *Rauwolfia:* some aspects of its botany, chemistry, and medicinal uses.
Colon. Plant Anim. Prod., 1955, **5:** 1-33, bibl. 238, illus.

The botany and distribution of *Rauwolfia* species are described, special attention being paid to *R. serpentina*. Information is given on indigenous uses, chemistry, pharmacology and therapeutic uses of the genus.

4133. Hochstein, F. A., Murae, K., and Boegemann, W. H.
Alkaloids of *Rauwolfia heterophylla*.
J. Amer. chem. Soc., 1955, **77:** 3551-4, bibl. 15.

Analyses of roots of the Central American shrub *R. heterophylla* confirmed the presence of 6 alkaloids, namely, reserpine, ajmalicine, rauwolscine, yohimbine, ajmaline and serpentine, and revealed the presence of a new one, heterophyllin.

4134. Chandra, V.
Vegetative propagation of *Rauwolfia serpentina* Benth.
Sci. and Cult., 1955, **20:** 554-6, bibl. 1.

In experiments in which hardwood cuttings were treated with either β-IAA, β-IPA or α-NAA at 10, 20, 30 and 40 p.p.m. for 3-24 hours or left untreated, 100% rooting followed treatment with IAA at 30 or 40 p.p.m. or NAA at 10 p.p.m. compared with no rooting in the controls. [See also *H.A.*, 24: 4012].—Nat bot. Gdns, Lucknow.

4135. Dubois, L.
***Rauwolfia vomitoria* Afzel.** [Flemish summary 2½ pp.]
Bull. agric. Congo belge, 1955, **46:** 567-95, bibl. 25, illus.

Botanical descriptions are given of the *Rauwolfia* spp. found in the Congo. Only *R. vomitoria*, and to some extent *R. caffra*, have medicinal uses. A map shows the distribution of the former. The pharmacology of the *Rauwolfia* alkaloids, their medicinal uses and the harvesting, drying and marketing of *Rauwolfia vomitoria* roots are discussed.—Dir. gén. Agric. Congo belge.

Essential oils.

(*See also* 3866, 4172e.)

4136. Guenther, E., and Langenau, E. E.
Essential oils and related products.
Analyt. Chem., 1955, **27:** 672-7, bibl. 135.

This is the fifth review by the authors of analytical procedures for essential oils and related products covering the literature from October 1952 to October 1954.

4137. Coomes, T. J., Islip, H. T., and Matthews, W. S. A.
***Aframomum angustifolium* seed from Zanzibar.**
Colon. Plant Anim. Prod., 1955, **5:** 68-77.

A systematic examination of the essential oil obtained from *Aframomum angustifolium* seeds showed that the oil consisted largely of hydrocarbons (terpenes and sesquiterpenes), with a low proportion of oxygenated compounds including some cineole. The identified compounds were nearly all of commercial interest, but no particular constituent predominated or was present in sufficient quantity to make isolation worth while. The oil itself is considered unsuitable for use in perfumes or toilet preparations.

4138. Schwob, R.
Étude sur l'essence de bergamote d'Afrique du Nord. **(Study of the essential oil of the bergamot oranges of North Africa.)**
Fruits d'Outre Mer, 1955, **10:** 263-70, bibl. 2, illus.

Biochemical studies on bergamot orange oil expressed from North African samples showed big differences in chemical composition. There were also differences due to season, stage of maturity, fruit quality, and conditions of extraction.

4139. Roy, H.
Les plantes à parfum dans les Alpes-Maritimes (première partie). **(Perfume plants in the Alpes-Maritimes. Part I.)**
Bull. tech. d'Inf., 1955, No. 96, from abstr. in *Ann. Soc. nat. Hort. France*, 1955, **1** (1): 30.

A general account of climate and soil conditions in this area and of the culture of flowers grown for the perfume industry is followed by a detailed account of the culture of the sour orange for its flowers. Competition from N. Africa may make it necessary to topwork the trees with edible citrus.

Fibres.

(*See also* 4172h, 4449n, 4476.)

4140. Grignac, P.
Essai de culture du genêt d'Espagne. **(Cultural trial on Spanish broom.)**
Progr. agric. vitic., 1955, **144:** 42-9, 62-70, bibl. 1.

A cultural trial on *Spartium junceum* planted at Lavalette in 1953 showed that: (1) yields of 20 tons green weight per ha. are obtainable on deep soils with adequate spring rainfall; (2) seed should be sown shallowly in drills 1 m. apart at 4 kg. per ha.; (3) three weedings are necessary in the 1st and one in the 2nd year. The attributes of a good harvested sample are a maximum moisture content of 25%, absence of other plants, a high proportion of stems of the current year, long basal and few apical branches, and stems of 6-15 mm. in diameter. The pros and cons of annual and biennial harvesting are discussed.—École nat. Agric., Montpellier.

Gums.

(*See also* 4124.)

4141. Charlson, A. J., Nunn, J. R., and Stephen, A. M.
***Acacia karroo* gum.**
J. chem. Soc. Lond., 1955, pp. 1428-31, bibl. several in text.

Data are given on the composition of the gum of *Acacia karroo*, an indigenous South African tree, known as doringboom, Karroo thorn or mimosa. The gum differs markedly in structure from the gum arabic of *A. senegal* and from other *Acacia* gums so far examined. —Univ. Cape Town and Coun. sci. industr. Res., Pretoria.

4142. van Prooijen, A. M.
Tragacantha.
Pharm. T. België, 1955, **32** (2): 34-9, from abstr. in *Trop. Abstr.*, 1955, **10**, No. c1509.

"Tragacantha", "tragacanth" or "traganth" is dried gum of various trees of the genus *Astragalus* (fam. Papilionaceae) found in the mountain ranges of Asia. The main species are *A. gummifer*, *A. microcephalus*, *A. stromatodes*, *A. kurdicus* and *A. verus*, which yield the Lesser-Asian tragacanth. Seven other species yielding Persian tragacanth are also mentioned. Botanical data are given.

Hops.

(*See also* 4172d, 4461.)

4143. Wye.
Report of the Department of Hop Research, Wye College, Kent, for 1954, 1955, pp. 129, 5s.

In addition to several papers abstracted below this report contains information on the breeding of new hops and the development of polyploids through crossing and the use of colchicine, observation trials with new hop varieties, notes on current research on hop drying, progress at the Rosemaund Experimental Husbandry Farm, Hereford, which was acquired for hop research in 1949, and, finally, a survey of recent hop research in countries overseas.

4144. Rosemaund (N.A.A.S.).
Farm Guide Rosemaund Experimental Husbandry Farm, 1955, Preston Wynne, Herefordshire, pp. 47.

Sixty acres of this farm are reserved for hops, and cultural trials have already been started. The remainder of the land is devoted to mixed farming.

4145. Beard, F. H., and Salmon, E. S.
Some new varieties of hops in Wye field plots, Wye College.
Detailed notes on some new varieties of hops in Wye field plots, Wye College.
A.R. Wye Coll. Dep. Hop Res. 1954, 1955, pp. 22-31, bibl. 2, and pp. 97-120, bibl. 9.

Information is given on the yields, physical, preservative and cultural characters, and susceptibility to downy mildew and mould of 33 new varieties representing 4 main lines of descent, namely, a Canterbury Golding × male OB21 cross (the male, derived from Brewer's Gold (C9*a*), introduced Manitoba genes), and open pollinated seedlings from the wild Manitoba BB1, Oregon Cluster and *Humulus americanus* var. *neomexicanus*.

4146. Beard, F. H., and Thompson, F. C.
The testing and selection of Fuggle and Golding clones. Progress report I.
A.R. Wye Coll. Dep. Hop Res. 1954, 1955, pp. 44-9, bibl. 2.

Trials are being made at Wye of different clonal stocks of Golding and Fuggle hops with the object of selecting those showing the best cropping performance allied to high preservative value and other desirable qualities. Attention is also being paid to selecting early, midseason and late clones of both varieties to meet the demands of machine picking. The origins of the present selections are summarized. Clones selected for further trial comprise 10 Fuggles, 20 Goldings and 4 Cobbs.

4147. Thompson, F. C.
An appraisal of the new (Wye) varieties of hops and their place and future in brewing.
J. Inst. Brew., 1955, **61:** 210-16, bibl. in text.

A historical account is given of the hop breeding work initiated and developed by Professor Salmon at Wye, primarily with the aim of producing varieties of high preservative value to replace imported American hops. It is shown how this aim has been achieved and an assessment is made of the present demand for the new varieties, chiefly Bullion and Brewer's Gold, John Ford, Northern Brewer and Pride of Kent. Developments are reviewed in the production of wilt-tolerant varieties, namely Bramling Cross (OT 48), Keyworth's Midseason (OR 55), 1147, C2, D1, D3, and J2.

4148. Beard, F. H., and Thompson, F. C.
Height of wirework and spacing trial. Progress report II.
A.R. Wye Coll. Dep. Hop Res. 1954, 1955, pp. 53-8, bibl. 2.

Yield data show the same trends as in 1953 [*H.A.*, 24: 4042] except that Fuggle produced appreciably more and Bullion appreciably less. The closest of the 3 spacings gave the highest yields, the greater number of hills outweighing the greater yield per hill at the wider spacings. The influence of the height of wirework was more pronounced and more consistent in 1954 than in 1953, the general effect being for yield to increase as the wirework is raised. The 1954 results thus lend further support to the conclusion drawn from the 1953 results that increasing the height of wirework produces the type of growth considered suitable for machine picking without having the unfavourable effect on crop yield shown by increasing the width of spacing. Investigations suggest that increase in height and in width of spacing increase total soft resins production, possibly because more light reaches the plants. [From authors' conclusions.]

4149. Thompson, F. C.
A long-term manurial trial on hops. Progress report 1954.
A.R. Wye Coll. Dep. Hop Res. 1954, 1955, pp. 64-71, bibl. 1.

In a trial laid down at Bodiam, Sussex, in 1949 the treatments given are 2 levels of N, P and K applied as FYM plus inorganics and as inorganics only and Mg *vs* no Mg. Conclusions to date are: (1) generous P manuring is important, especially when young hops are being established on P-deficient soils; (2) K deficiency is the dominant nutritional factor on K-deficient soils but generous K manuring (400 lb. K_2O per acre) does not cure the trouble, and K uptake may be adversely affected by heavy P manuring with the commonly used fertilizers (all of which are Ca compounds) through the increased Ca content of the plant; (4) N and Mg status are markedly affected by seasonal conditions; (5) cone resin content is little affected by the treatments; (6) yields from FYM plus inorganics and from inorganics only differ little.

4150. Muroga, T.
Process of flower bud differentiation in the hop plant. [Japanese, with English summary ½ p.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951, **13:** 20-5, bibl. 2, illus. [received 1955].

The process is illustrated by micro-photographs and sketches of material collected every 3 days from the commercial variety Shinshu-wase during 2 seasons. Most primordia differentiated in late May/early July in the order, outer bract, ovary, inner bract, stigma, pericarp. Four stages were recognizable in the differentiation of the female inflorescence, namely, (1) non-differentiating stage; (2) initiation of floral primordia; (3) differentiation of individual flowers; (4) development and completion of flowers.—Nagano pref. agric. Exp. Stat.

4151. Thompson, F. C.
A note on the effect of premature cutting of hop bines on the yield of hops.
A.R. Wye Coll. Dep. Hop Res. 1954, 1955, pp. 59-63, bibl. 2.

Mechanical picking is now a significant factor in hop production in England and the number of machines is likely to increase rapidly in the next few years. With the majority of machines in use it is necessary to cut the hop bines at picking time instead of allowing them to ripen off before cutting, as is the custom with hand picking. There is no doubt that premature cutting prevents the transfer of an appreciable amount of plant nutrients from the bine back to the rootstock, and this might be expected to have a weakening effect on the plant. The magnitude of this effect has yet to be assessed, however, and the evidence to date on its significence is conflicting. [From author's conclusions.]

4152. Keller, K. R., and Laning, E. R., Jr.
Chemical stripping and suckering of hops.
Agron. J., 1955, **47:** 251-3.

Preliminary trials were conducted in hop gardens near Corvallis, Oregon, in 1953 and 1954 on the variety Fuggles to evaluate the effectiveness of chemicals for stripping and suckering hop plants to reduce the need for hand labour. Of 9 chemicals used in one trial, only isopropyl N–(3 chlorophenol) carbamate (CIPC) significantly reduced yields and percentage of total soft resin content, alpha acid and beta fraction, compared with the controls stripped and suckered by hand. Leaf injury was caused by some of the other chemicals, however, and only Endothal and Experimental Herbicide No. 3 were considered promising. In another trial with 8 chemicals used at various rates, significant differences were noted among treatments. Results from the analyses of harvest weights, leaf injury and costs again indicated that Endothal and Experimental Herbicide No. 3 may be of value.

4153. Weston, E. W.
Examination of the organic constituents of hop plants.
A.R. Wye Coll. Dep. Hop Res. 1954, 1955, pp. 72-7, bibl. 1.

The results are given of qualitative and quantitative analyses by paper chromatography of the chemical components of the roots, bines, leaves and cones of several hop varieties including Pride of Kent. Information is given on the chlorophyll, aromatic, acidic, basic, and neutral fractions.

4154. Cook, A. H., Howard, G. A., and Slater, C. A.
Chemistry of hop constituents. VIII. Oxidation of humulone and cohumulone.
J. Inst. Brew., 1955, **61:** 321-5, bibl. 7.

The preparation of humulinone by the oxidation of humulone affords a single substance, whilst the similar oxidation of cohumulone leads to a single cohumulinone. The physical and chemical properties of humulinone and cohumulinone suggest that they may be identical with the compounds of m.p. 70-71°C. and m.p. 104-105°C., respectively, described by Verzele and Govaert [see *H.A.*, 23: 935]. [Authors' summary.]—Brew. Indust. Res. Found., Nutfield.

4155. RIGBY, F. L., AND BETHUNE, J. L.
Components of the lead-precipitable fraction of *Humulus lupulus*. Adhumulone.
J. Amer. chem. Soc., 1955, **77**: 2828-30, bibl. 8.

Adhumulone, which was detected earlier in the lead-precipitable fraction of a hop extract, has been isolated. Its properties indicate that it has a close structural similarity to humulone.

4156. LEGG, J. T.
The spread of nettlehead disease and its association with split leaf blotch virus in certain hop varieties.
A.R.E. Malling Res. Stat. 1954, 1955, **A38**: 128-32, bibl. 4.

In a field trial in the West Midlands nettlehead virus disease spread at different rates among clones of the six new varieties of hops, College Cluster, Brewer's Standby, Quality, Malling Midseason, Bullion and Concord, and two clones of Fuggle. The occurrence of split leaf blotch virus disease was also noted, and the records indicate latent infection in the two Fuggle clones and suggest that the other six varieties are potential carriers. It would seem that differences in susceptibility to nettlehead disease may be due to genetical differences between varieties, or possibly to differing proportions of plants being infected with split leaf blotch virus, if this virus is a component of a complex causing nettlehead. The evidence for such a complex is inconclusive. [Author's summary.]

Insecticidal plants.

(*See also* 4476.)

4157. IRVINE, F. R.
West African insecticides.
Colon. Plant Anim. Prod., 1955, **5**: 34-8.

A brief survey is given of insecticides used currently by West Africans. Insecticidal plants in the alkaloid-containing groups are *Nicotiana* spp., *Annona* spp., *Erythrophloeum guineense*, *Sophora tomentosa* and *Melia azedarach*. Species containing rotenonoids include *Tephrosia* spp., *Mundulea sericea*, *Lonchocarpus* sp. and *Millettia* sp. Resins, either of contact or fumigant toxicity, are extracted from *Dichapetalum* spp., *Croton tiglium*, *Anacardium occidentale* and *Carapa procera*. *Boswellia dalzielii*, *Daniellia oliveri*, *Commiphora africana* and *Detarium senegalense* contain fragrant gum resins used as insecticides. Among the Labiatae *Hyptis spicigera*, *Leucas martinicensis* and *Ocimum americanum* produce essential oils which are insecticidal; *Lippia citriodora* is also effective in this way. Other plants of possible insecticidal value are mentioned.

4158. KATUDA, Y., TIKAMOTO, T., AND NAKASIMA, K.
Studies on the degradation of pyrethrins. I and II. [Japanese, with English summaries ½ p. each.]
Bull. Inst. Insect Control Kyoto, 1955, **20** (1): 15-21, bibl. 20, and 21-6, bibl. 10.

The pyrethrins content of pyrethrum flowers was studied by polarography and the modified Seil method at various intervals after drying and after exposure to various temperatures, with the following results; (1) Flowers of a variety rich in pyrethrins II showed a high content when freshly dried and a low content a year later when determined polarographically but a high content on both occasions when analysed by Seil's method. Biological assay confirmed the accuracy of the former method. (2) The ratio between the contents given by the polarographic and the Seil method diminished as the flowers developed, reached a minimum at full bloom, and then increased again. (3) Losses of pyrethrins in extracts exposed to the sun for 100 days were greater than in extracts protected from ultra-violet rays. Polarographic analysis again showed greater decomposition than the other method. (4) The decomposition of pyrethrins kept at 60-100°C. for 0-360 minutes increased with temperature and duration and was greater in powdered pyrethrum than in whole flowers. (5) In tests over 14 months fermented flowers lost pyrethrins faster than unfermented flowers at first, but this trend was gradually reversed so that finally the content of fermented flowers was rather higher than that of unfermented.—Res. Lab. Dianippon Jotugigu Co.

Rubber plants.

4159. RODRÍGUEZ, E., AND OTHERS.
Aprovechamiento industrial del *Taraxacum kok-saghyz* Rod. Analisis quimico preliminar. **(Industrial utilization of *Taraxacum kok-saghyz*. Preliminary chemical analysis.)**
JIMÉNEZ, J., AND OTHERS.
Alcoholes triterpénicos y esteroles de la raíz de *Taraxacum kok-saghyz* Rod. **(Triterpene alcohols and sterols of the root of *Taraxacum kok-saghyz*.)**
HORCHE, T., AND OTHERS.
Acidos grasos de la raíz del *Taraxacum kok-saghyz*. **(Fatty acids of the root of *Taraxacum kok-saghyz*.)**
An. Inst. nac. Invest. agron. Madrid, 1955, **4**: 133-44, bibl. 9, illus., 145-51, bibl. 12, illus; 153-9, bibl. 17.

Roots of kok-saghyz were analysed with a view to discovering substances of possible industrial use in addition to rubber. Potentially valuable fractions, here reported on in detail, were those containing triterpene alcohols, phytosterols and fatty acids.

4160. HUNTER, A. S., AND BURTCH, L. M.
The effects of variations in plant density, soil moisture, and fertility levels upon rubber production by krim-saghyz.
Agron. J., 1955, **47**: 304-7, bibl. 2.

The rubber producing potentialities of krim-saghyz, *Taraxacum megalorrhizon*, were investigated in an experiment involving 3 densities of plant stand, 3 irrigation treatments and 4 fertilizer treatments. All plots were sampled 7½ and 20 months after sowing. In the first harvest (at 7½ months) the maximum rubber yield of 140 lb. per acre was produced by a combination of high moisture, dense stand and 150 lb. N per acre. In the second harvest the maximum rubber yield of 305 lb. per acre was produced by a combination of medium moisture, dense stand and 150 lb. N per acre. Soil moisture had no significant effect on concentration of rubber in the plants. Concentration and yield of rubber increased continuously with time, but the weight of roots decreased during periods of dormancy. The rubber production obtained from krim-saghyz was less than half that reported for guayule of approximately the same age at harvest. In a supplementary experiment comparing the rubber production of krim-, kok- and tau-saghyz, krim-saghyz produced the highest yields.

Seed oils.

(*See also* 4124, 4172b, i. j, 4479, 4483.)

4161. Bharucha, K. E., and Gunstone, F. D.
Vegetable oils. IV. A new method of determining the component acids of oils containing epoxy- and/or hydroxy-acids.
J. Sci. Food Agric., 1955, **6**: 373-80, bibl. 21.

The method is described and applied to the seed oils *Vernonia anthelmintica* and *Strophanthus hispidus* containing 12:13-epoxyoctadec-9-enoic (74%) and 9-hydroxyoctadec-12-enoic acid (15%) respectively. Some new derivatives of the latter acid are reported and the periodate method of determining α-glycols is criticized. [From authors' abstract].—Glasgow Univ.

4162. Fairchild, P. L. K., Raymond, W. D., and Spickett, R. G. W.
The extraction of oil from conophor nuts (*Tetracarpidium conophorum*).
Colon. Plant Anim. Prod., 1955, **5**: 63-8.

Oil extracted from unheated kernels of the conophor nut by solvents was of poor quality, and it is considered that methods based on solvent extraction are probably uneconomic. Boiling the kernels with water did not cause oil separation. Suggestions, based on standard oil milling techniques, are made for drying and processing conophor nuts under West African conditions.

4163. Aggarwal, J. S.
Kamala seed oil.
J. Sci. Food Agric., 1955, **6**: 364-8, bibl. 24.

Tables are given showing the characteristics of kamala seed oil from the tropical evergreen tree *Mallotus philippinensis*. The oil is used for paints and varnishes. Kamala seed cake has been found to contain 48% proteins and will therefore be a useful fertilizer.—Nat. chem, Lab. India, Poona.

4164. Fairchild, P. L. K., Johnson, R. M. and Raymond, W. D.
Melon seed (*Citrullus vulgaris*) oil from the Sudan.
Colon. Plant Anim. Prod., 1955, **5**: 62-3.

A sample of melon seed oil, although inferior to soya bean and cottonseed oils in colour and stability, showed favourable commercial prospects for the U.K.

4165. Adrian, J., Rérat, A., and Xabregas, J.
Une nouvelle possibilité alimentaire africaine. L'huile et le tourteau de *Ricinodendron rautanenii.* **(A possible addition to African diet. The oil and press cake of *Ricinodendron rautanenii.*)**
Oléagineux, 1955, **10**: 481-7, bibl. 10.

Industrial production is planned of the seed oil of *Ricinodendron rautanenii*, a small tree common in the forests of the Lower Cunene and Cuando-Cubango districts of southern Angola. An annual production of 3,000 tons of seed oil and 5,000 tons of press cake could be achieved. The physical characteristics of the seed oil and the chemical composition of the oil and cake are given. The kernel contains more than 50% oil and the cake has a protein content similar to that of shelled groundnuts.—Lab. Biochim. Nutrit. C.N.R.S., Bellevue, S.-et-O.

4166. Anon.
Safflower, a drought resistant oil seed crop for the wheat belt?
Rur. Res. C.S.I.R.O., 1955, No. 12, pp. 2-5, illus.

Safflower is being studied in Australia in both tropica and dry-land areas. In experimental plots the use of improved varieties and cultural methods have resulted in high yields, Varieties with seeds containing 40% oil have been developed. A type containing a high quality edible oil has also been found. Other breeding projects are aimed at producing early, rapidly-elongating varieties, which will outpace weeds, and varieties less sensitive to high soil moisture conditions during germination.

4167. Beard, B. H.
A comparison of the effects of X-rays and thermal neutrons on the dormant seeds of barley, maize, mustard and safflower.
Diss. Abstr., 1955, **15**: 493, being *Publ.* 11,220 of 110 pp.

The average height of seedlings was reduced and the average percentage of abnormal pollen was increased with each increase in dose of X-rays or thermal neutrons.

Tannin plants.

(*See also* 4172f.)

4168. Brockway, G. E., and Hillis, W. E.
Tanbark eucalypts of the semi-arid regions of south western Australia.
Emp. For. Rev., 1955, **34** (1): 31-41, illus. from abstr. in *Trop. Abstr.*, 1955, **10**, No. c1500.

Description of the habitat, distribution and site requirements of seven tannin-bearing eucalypts. The most important species is *E. astringens* (brown mallet). Existing data indicate that brown mallet may be as profitable as wattle as a source of tannin and is less selective in its growth requirements.

Waxes.

(*See also* 4124.)

4169. Raymond, W. D., Thorpe, E. F. J., and Ward, J. B.
Sisal wax from Kenya.
Colon. Plant Anim Prod., 1955, **5**: 58-61.

A refined sample of sisal wax, a by-product of the fibre industry, was analysed and trials were made of its polishes. The gloss produced by the wax polish was good, being comparable to that of a carnauba wax polish [see also *H.A.*, 24: 2894]. The emulsion polish was not satisfactory as it hardened on standing.

Sundry plants.

4170. Lakshminarayan Rao, M. V., Subramanian, N., and Srinivasan, M.
Nutritive value of bamboo seeds (*Bambusa arundinacea,* Willd.)
Curr. Sci., 1955, **24:** 157-8, bibl. 7.

Bamboo seeds were found to have a higher food value than rice and wheat. Data on the composition of the seeds are presented.—Centr. Food Tech. Res. Inst., Mysore.

4171. Barnes, R. A., and Gerber, N. N.
The antifungal agent from osage orange wood.
J. Amer. chem. Soc., 1955, **77:** 3259-62, bibl. 14.

The wood of the osage orange, *Toxylon pomiferum*, [*Maclura pomifera*] has been found to contain approximately 1% of 2,3′,4,5′-tetrahydroxystilbene. This substance was toxic to five of thirteen microorganisms tested and its presence is believed to be the main reason for the remarkable resistance of osage orange wood to decay. [From authors' abstract].—School Chem., Rutgers Univ., N.J.

Noted.

4172.

a Bader, F. E., and others.
***Rauwolfia* alkaloids. XVII. 3-Epi-α-yohimbine.**
J. Amer. chem. Soc., 1955, **77:** 3547-50, bibl. 18.
A new alkaloid from *R. serpentina*.

b Cabra Fernandez, H.
Sobre el aprovechamiento industrial de la chumbera. **(On the industrial exploitation of prickly pear.)**
[*Publ.*] *Comm. int. Ind. agric. alim.*, 1954, pp. 11, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (6): *Suppl. Fruits trop. subtrop.*, No. 12-10492.
For alcohol and seed oil.

c Chatterjee, A., and Bose, S.
On the constitution of ajmaline, the alkaloid of *Rauwolfia serpentina* Benth.
Sci. and Cult., 1955, **20:** 606-9, bibl. 18.

d Fišer, F.
Pokusi s hmeljnim ekstraktom. **(The hop extract.)** [English summary $\frac{1}{3}$ p.]
Poljopr. Znanst. Smot., 1953, **15** (1): 177-86, bibl. 4.
Including chemical analyses of some Yugoslav and foreign hops.

e Guenther, E.
Flower oil industry of North Africa.
Amer. Perf. Ess. Oil Rev., 1953, **62** (3): 185, from abstr. in *Econ. Bot.*, 1955, **9:** 140.
Roses in Morocco, jasmine, geranium, etc., elsewhere.

f Happich, M. L., Beebe, C. W., and Rogers, J. S.
Tannin evaluation of one hundred and sixty-three species of plants.
J. Amer. Leather Chem. Ass., 1954, **49:** 760-73, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-73-6,** 1955, No. 871.
Being studied as cortisone precursors.

g Heerklotz, H.
Kurzer Überblick über neuere Literatur auf dem Gebiete der Arznei- und Gewürzpflanzen (Stand 1954). **(A short survey of recent literature (up to 1954) on medicinal and culinary plants.)**
Dtsch. Gartenb., 1955, **2:** 227-8, bibl. 66.

h Hitchcock, Sir E.
The sisal industry of Tanganyika.
Reprinted from *Tanganyika Trade Bull.*, 1955, No. 1, pp. 11.
Includes figures for production, exports and prices.

i Kaufmann, H. P., and Vazquez Roncero, A.
Sobre el aceite de semilla de *Hippophaë rhamnoides* L. I. Estudio de los ácidos grasos. **(On the seed oil of *Hippophaë rhamnoides.* I. The fatty acids.)**
Grasas y Aceites, March/April 1955, from abstr. in *Bol. Oleic. int.*, 1955, **5** (26): 102.

j Morrison, K. J.
Growing safflower in Washington.
Ext. misc. Publ. Wash. St. agric. Ext. Serv. **26,** 1954, pp. 3.

k Myers, G. S., and others.
Some new hypotensive ester alkaloids from *Veratrum viride.*
J. Amer. chem. Soc., 1955, **77:** 3348-53, bibl. 11.
From ground roots and rhizomes of commercial *V. viride*.

l Sastri, R. L. N.
Structure and development of nutmeg seed.
Curr. Sci., 1955, **24:** 172-3, bibl. 2, illus.

m Tayeau, F., Faure, F., and Séchet-Sirat, J.
Étude sur le *soumpe* (*Balanites aegyptiaca*). Valeur alimentaire de ses protéines. **(Food value of the proteins of *Balanites aegyptiaca.*)**
J. Agric. trop. Bot. appl., 1955, **2:** 40-9, bibl. 22, illus.
Notes on the tree and analysis of its fruit and seeds.

FLORICULTURE.

General.

(*See also* 3412, 3423, 3424, 3456, 3463, 3497, 3498m, x, 3499d, f, 3763, 3844, 3850-3852, 3884, 3900, 3901, 3917, 4268f, j, p, q, 4269d, e, g, j, p, 4454, 4464, 4470, 4472, 4484, 4485.)

4173. GARTHWAITE, J. M.
Flower section.
Rep. Luddington exp. Hort. Stat. for 1954, 1955, pp. 55-61.

Work reported includes: *Dahlias:* maintenance and propagation of virus-free stocks. *Gerberas:* pH and fertilizer trial, hardiness observations and nutrition experiment. *Chrysanthemums:* propagation and culture of early-flowering varieties, *C. maximum* variety trial. *Miscellaneous trials and studies* on antirrhinum, polyanthus, wallflower and delphinium.

4174. FLOOR, J., AND WEZELENBURG, P. A.
Planten in plastic. **(Plants in plastic.)**
[*Publ.*] *Inst. Vered. Tuinbouwgew. Wageningen*, 1955, pp. 10, illus., fl. 0·25.

This popular, revised edition of a previous publication [see *H.A.*, 24: 2204] is concerned with propagating house plants from cuttings and by grafting. Plastic covers over flower pots provide satisfactory rooting conditions.

4175. DUSTAN, A. G.
Report of the acting Plant Pathologist for the year 1953.
Staff Reps. Bermuda Dep. Agric. 1953, pp. 9.

Juniperus bermudiana. Investigations showed that specimens displaying resistance to the juniper scale, *Carulaspis visci*, which has greatly reduced the numbers of the native cedar since infestation began in 1944, are mostly male (70%) and have shorter needle glands and more oil globules in the needle tissue than susceptible trees. *Chlorosis of lilies.* Sequestrene and Ferrogreen dusts gave complete control when applied to the soil, the former taking about a month and the latter longer. *Weed control in Easter lilies.* 2 lb. 2,4-D or 1 lb. CMU per acre applied before the emergence of the lilies gave good control. *Pulvinaria psidii.* A single application of 6% malathion gave 98% control of the adults and nymphs, but not of the eggs, of the green shield scale, which severely damages oleanders and other ornamentals and citrus. *Calpodes ethlius.* Two egg parasites, *Ooencyrtus* sp. and *Trichogramma* sp., and a larval parasite, *Elachertus meridionalis*, of the canna leaf skipper were introduced.

4176. FELDMESSER, J., AND FEDER, W. A.
Organic mercury dips for the control of nematodes in roots of living plants.
From abstr. in *Phytopathology*, 1955, **45:** 347.

Two organic mercurials, Aaventa and Aabulba, show promise of controlling the golden nematode (*Heterodera rostochiensis*) adherent to roots and the root-lesion nematodes (*Pratylenchus* spp.) and the root-knot nematodes (*Meloidogyne* spp.) within the roots of living plants. Two hundred and eighty dip-tests showed that exposures to 2% for 10 minutes, to 1% for 1 hour, to ½% for 3 hours, and to ¼% for 6 hours of either chemical were lethal to larvae within golden nematode cysts. Bare-rooted ornamentals infected with *Pratylenchus* spp. and *Meloidogyne* spp. were freed of their viable nematodes after 1-hour dip treatment with Aaventa. Periodic observations indicated that nematodes probably are killed within 48 hours of treatment. Aaventa proved to be less phytotoxic than Aabulba, but both were equally nematocidal. A number of commercially important ornamental plants of genera such as *Philodendron*, *Pothos*, *Peperomia*, and *Sansevieria* have been successfully treated.

4177. STANILAND, L. N.
Recent research on important horticultural pests in the South West [of England].
Sci. Hort., 1952-54, **11:** 191-6.

Dilute chlorphenol (0·1%) with a detergent has given better control of bulb eelworm in narcissus than hot-water treatment. For chrysanthemum eelworm hot water treatment of the stools for 5 mins. at 115°F. gave complete cotrol with little or no growth retardation. Control of *Ditylenchus dipsaci* in strawberries was good after hot water treatment for 7 mins. at 115°F.; for *Aphelenchoides* spp. treatment for 10 mins. was necessary. Hot water treatment of mint stolons at 115°F. for 10 mins. has given excellent results. *Lilium henryi*, *L. regale*, and *L. longiflorum* were treated for 1½ hrs. at 110°F. to control *Aphelenchoides fragariae.* Root lesion nematode (*Pratylenchus pratensis*) has been shown to be the cause of root rots in delphiniums, and can be controlled by soil treatment with DD. Control of symphylids has been obtained by watering tomatoes and pot plants with parathion solution.

4178. PEPPER, J. O., AND GESELL, S. G.
The Japanese beetle and its control with control for other grubs in turf.
Circ. Pa agric. Ext. Serv. **451,** [1955?], pp. 9, illus.

This circular deals with the appearance and habits of the beetle [*Popillia japonica*], the damage caused by adults and larvae, the use of DDT, malathion, methoxychlor, lead arsenate and rotenone or pyrethrum-rotenone for controlling the adults, the protection of fruits, shade trees and ornamentals, and the control of its own and other grubs in turf and soil with aldrin, chlordane, DDT, dieldrin, heptachlor or lead arsenate or with milky disease bacteria.

Annual and herbaceous plants.

(*See also* 4268a, c, i, o, t, v, y.)

4179. RUGE, U.
Althaea ficifolia aus Samen. (***Althaea ficifolia* from seed.**)
Gartenwelt, 1955, **55:** 178-9, illus.

Two hours' exposure of air-dried *Altheae ficifolia* seed to a temperature of about 78°C. greatly improved germination and seedling growth, irrespective of whether the pericarp was removed prior to treatment or not.—Tech. Hochschule, Hanover.

4180. MERLO, A. S.
The influence of mineral fertilizers on the decorative qualities of asters. [Russian.]
Sad i Ogorod, 1955, No. 5, pp. 69-70, illus.

Experiments have shown that a complete fertilizer greatly improves the growth, flower and seed qualities and wilt resistance of asters. With the variety Hercules the best results were obtained with 34 g. ammonium nitrate, 50 g. superphosphate and 18 g. potassium salt per sq. m. Improvements in asters due to applications of Zn, Cu, B and Mn are described. B in excess of 1 g. of boric acid per sq. m. was phytotoxic.

4181. Mameli Calvino, G. E.
Accorgimenti, orientamenti e progressi nella coltivazione del garofano. (**Trends and progress in the culture of carnations.**)
Riv. Ortoflorofruttic. ital., 1955, **39**: 223-32, illus.

Carnation culture in the Italian Riviera is discussed under the following headings: culture under glass, growth substances for rooting, nutrition, pest and disease control, sprinkler irrigation, development of perpetual-flowering carnations, summer production and the registration and patenting of new varieties.—Staz. sper. Floricolt. Sanremo.

4182. Shushan, S., and Johnson, M. A.
The shoot apex and leaf of *Dianthus caryophyllus* L.
Bull. Torrey bot. Cl., 1955, **82**: 266-83, bibl. 34, illus.

Detailed histological observations are reported on the various stages of development of the shoot apex and leaf in several varieties of white flowered carnation.—Univ. Colo., Boulder, and Rutgers Univ., New Brunswick, N.J.

4183. Monselise., S. P., and Hagin, J.
Influence of soil aggregation on the rooting of carnation cuttings.
Plant and Soil, 1955, **6**: 245-50, bibl. 5.

Cuttings of a variety of the Chabaud type were rooted in a fine-textured soil, which had been broken down to yield coarse, medium-sized and fine aggregates. Root initials were found in the basal callus of cuttings in all soil treatments 2 weeks after planting. The best rooting results were obtained with the coarse aggregate and the worst with the medium aggregate. Intermediate results were obtained with the fine aggregate, probably due to fissures formed at the point of insertion of the cuttings which improved aeration. The amount of roots at the end of the experiment was greatest with cuttings rooted in the coarse aggregate, but there was no significant difference between the other treatments.—Hebrew Univ., Rehovot, Israel.

4184. Fjäderhane, A. M.
Nätningsförsök med nejlikor. (**Time studies in carnation stringing.**) [English summary 1½ pp.]
Medd. Alnarpsinst. trädgårdsekon. Byrån **18**, [1955 ?], pp. 18, illus.

Most of the trials described were carried out on 1 m-wide beds with 6, 8, 10, 12 and 14 strings at 4 heights ranging from 0·35 m. to 1·80 m. Graphs and figures show the increase in working time associated with increases in the number and height of strings. The methods of stringing used are clearly illustrated by line drawings and photographs. In a comparison of methods it was found that two men each with a ball of string working across the bed from the outer wires were 12% more efficient than two men starting in the middle with one man having the ball of string. Observations made in another trial indicate that the best results may be expected from a bed width of 1–1·10 m. and that a width exceeding 1·30 m. is uneconomical.

4185. Nelson, K.
Carnations.
Flor. Exch., 1955, **124** (21): 11, 42.

Advice is given on controlling the cropping of carnations, under central Ohio conditions, by adjusting the time of pinching to the expected weather conditions for that time of year and by suitable propagation practices.

4186. Hellmers, E.
Bacterial wilt of carnations.
Gdnrs' Chron., 1955, **137**: 194, illus.

Both quick- and slow-developing symptoms are described of a bacterial wilt disease of carnations encountered in 1953 in rooted cuttings in Denmark. The causal organism bears a close resemblance to *Pseudomonas caryophylli* which causes bacterial wilt in the U.S.A. The disease has since been found in plants imported from several other European countries. Control can be obtained by planting healthy cuttings in new or sterilized sand or soil, but it is difficult to identify slightly infected cuttings which show no symptoms. A method of testing cuttings is described, which will show if they are free from bacterial wilt and from endoparasitic fungus diseases other than obligate parasites. This method has already been applied auccessfully on a commercial scale.—Dep. Plant Path., Roy. vet. agric. Coll., Copenhagen.

4187. Viehmeyer, G.
Chrysanthemum improvement.
Bull. Neb. Coll. Agric. **428,** 1955, pp. 20, illus.

The Chrysanthemum Breeding Project at the North Platte Experiment Station, started on a small scale 10 years ago and since expanded into a full-scale breeding programme, has already achieved notable results. Fifteen hardy varieties have been named and released, 4 of which have become important throughout the U.S.A. A new 'carnation-flowered' race of hardy chrysanthemums has also been introduced and the foundations laid for producing varieties tolerant to temperatures of 20°F. and lower and garden varieties possessing the flower quality of greenhouse types. This bulletin describes the breeding methods used at North Platte, discusses sources and inheritance of desirable characters and the selection and testing of new varieties and offers suggestions to assist the amateur who wishes to breed chrysanthemums.

4188. Cathey, H. M.
Chrysanthemum temperature study. A. Thermal induction of stock plants of *Chrysanthemum morifolium*
Proc. Amer. Soc. hort. Sci., 1954, **64**: 483-91, bibl. 9, illus.

In the chrysanthemum variety Encore cuttings from stock plants grown at 60°F. produced normal vegetating and flowering plants. If the temperature on the stock plants was raised to a minimum of 70°F., premature budding and irregular growth from a pinch occurred. If the temperature on the stock plant was reduced to 55 to 50°F., premature budding and delayed flowering resulted. Varieties responded differently. The plants grown from cuttings produced at a minimum night temperature of 50 to 55°F. produced a greater number of flowers, longer stems and heavier sprays than the plants grown from cuttings produced at 60°F. Flower bud initiation, number of days to flower, and spray type were controlled to a greater extent at a constant night temperature of 60°F. Stock plant temperatures of 70 or 80°F. on Encore produced plants which did not produce lateral shoots when they were pinched. Irregular flowering resulted. [Author's summary.]—Cornell Univ.

4189. Cathey, H. M.
Chrysanthemum temperature study. B. Thermal modifications of photoperiods previous to and after flower bud initiation.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 492-8, bibl. 1.

The effect of temperature on the flowering of chrysanthemums was studied using high (80°F.), medium (60°F.) and low (50°F.) temperatures during the stock plant period, in association with 50, 55, 60, 70 and 80°F. during the vegetating, bud initiation and bud development periods. The varieties studied were classified into 3 temperature response groups: thermozero (flowering not inhibited), thermopositive (flowering inhibited by low temperature), and thermonegative (flowering inhibited by high temperature). Thermopositive varieties required a temperature of 60°F. or above for bud initiation, the higher the temperature the more rapid being initiation. Low temperature (60°F.) after buds were initiated made little difference to flowering time but high temperature (80°F.) delayed flowering. Thermonegative varieties initiated buds at all the temperatures tested (50-80°F.) but required a temperature of 60°F. or below for bud development. Temperatures above 60°F. after bud initiation inhibited flowering. [See also *H.A.*, 25: 1904.]—Cornell Univ.

4190. Cathey, H. M.
Chrysanthemum temperature study. C. The effect of night, day, and mean temperature upon the flowering of *Chrysanthemum morifolium*.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 499-502, bibl. 3, illus.

The thermopositive chrysanthemum variety Encore was used in this factorial experiment with various day and night temperatures ranging from 40 to 80°F. Night temperature affected flower development more than day temperature. The higher the night temperature, the shorter was the time required for bud initiation and the greater was the number of flowers produced. A medium night temperature (60°F.) resulted in flowering in the shortest time. The mean growing temperature (average of night and day) was not correlated with flowering time.—Cornell Univ.

4191. Cathey, H. M.
Why stubborn chrysanthemum varieties?
Bull. N.Y. St. Flower Grs, 1955, No. 116, pp. 1-2, bibl. 3, illus.

Experiments were carried out to determine the effect of the date of starting short-day treatment on the flowering of the thermonegative chrysanthemum variety Revelation. Under short-day treatment bud initiation occurred throughout the year, but flower development did not occur until the temperature dropped to 60°F. or lower for a large part of the night. Higher temperatures at the beginning of short-day treatment resulted in compound sprays with a large number of flower buds. High light intensity during short days had little effect on flowering when night temperatures were controlled at 55°F.—Cornell Univ.

4192. Doorenbos, J.
Daglengte en bloei bij *Chrysanthemum morifolium.* **(The relation between day-length and flowering in *Chrysanthemum morifolium.*)** [English summary ⅗ p.]
Meded. Dir. Tuinb., 1955, **18:** 375-90, bibl. 16, illus.

Under natural short-day conditions the date of flowering of a chrysanthemum variety is a guide to its short-day requirements; later flowering varieties need relatively short days, while very early varieties are not affected by photoperiod. Under constant short-day conditions differences in date of flowering between varieties are due to differences in the start of flower initiation and in the length of time required for development of the inflorescence. All varieties begin inflorescence initiation even in continuous light. In late varieties the crown bud, initiated in long days or after a limited number of short days, does not develop, mainly owing to the inhibiting effect of the lateral shoots. For optimal flowering a late variety needs short days until the formation of the flower primordia has been completed; the subsequent photoperiod has no effect on the date of flowering. Elongation of the internodes just below the inflorescence is promoted by long days during inflorescence initiation. The author suggests that there are 3 stages in auxin production of the stem tip: a high production rate in the vegetative tip; a sharp drop in auxin production as soon as, or just before, the tip becomes generative; and a high production rate again when the floral parts (probably in particular the ovaries) have been formed.—Lab. Tuinbouwpl., Wageningen.

4193. Kamemoto, H., and Nakasone, H. Y.
Flowering behaviour of chrysanthemums in tropical Hawaii.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 468-82, bibl. 17, illus.

The longest day in Hawaii, June 21, is only 14 hr. 15 min., slightly below the critical day-length for flower bud initiation in chrysanthemum, whereas the critical day-length for flower bud development is not reached until the end of August. The result is that buds are initiated throughout the year, but only develop in the autumn, giving rise to the profuse production of poor quality flowers on excessively branched short stems. Earlier flowering is obtained with an increase in elevation, and at 4,300 ft. flowering occurs throughout the summer, earlier planting leading to earlier flowering. In order to obtain flowers during summer at low elevations it is necessary to shorten the day-length artificially by means of shading, but the practice is unprofitable out-of-doors in Hawaii. The quality of autumn-flowering chrysanthemums grown at low elevations can be greatly improved by supplying light to lengthen the days in summer, and this is considered to be both feasible and desirable for the production of single-stemmed, good quality blooms. Moreover, by the use of artificial light chrysanthemum flowering can be timed for any date between the autumn and May, and the yield of the ratoon crop can be increased 2- to 3-fold. [See also *H.A.*, 23: 4426.]—Univ. Hawaii, Honolulu.

4194. ASEN, S., WITTWER, S. H., AND TEUBNER, F. G.
Factors affecting the accumulation of foliar applied phosphorus in roots of *Chrysanthemum morifolium*.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 417-22, bibl. 8, illus.

The per cent of foliar applied P accumulated in the roots of *Chrysanthemum morifolium*, as well as the per cent of P in the roots derived from treatment, increased with decreased temperature and with concentration of available P in the growing medium. Foliar applications of P had their greatest beneficial effect on growth when applied at temperatures of 50 and 70°F., and least effect at 60°F. [Authors' summary.]—Mich St. Coll., E. Lansing.

4195. BESEMER, A. F. H.
Die Wahl eines geeigneten Nematizids. **(The choice of a suitable nematocide.)**
Mitt. biol. Bundesanst. Berlin-Dahlem, 1955, Heft 83, pp. 122-7, illus.

Experiments carried out on chrysanthemums in the open and, to a smaller extent, on glasshouse lettuces and tomatoes and field-grown carrots led the author to the conclusion that DD was superior to other nematocides tested. In sandy and light soils sowing or planting can be done safely 3-4 weeks after treatment, but in moist soils rich in humus DD remains phytotoxic for longer periods. For economic reasons attention must also be paid to crop rotation. *Hoplolaimus* sp., *Pratylenchus pratensis* and other Tylenchidae were the nematodes controlled in the field and *Meloidogyne* sp. in the glasshouse soils.

4196. VAN STEEN, J.
Belichtingsproef met cineraria H. **(Illumination experiment with cineraria.)**
Cult. Hand., 1955, **21**: 200-2.

Plants of *Cineraria hybrida* "Aalsmeers Reuzenmengsel" were grown in supplementary light in an attempt to get earlier flowering. Lamps of 80 W were hung 60 cm. above the benches, and an average of 6¼ extra hours were given. Supplementary lighting was started on 11 December and the first plants flowered on 25 January. Control plants, grown without extra lighting, began flowering on 5 February.

4197. GUALACCINI, F.
La *Gerbera jamesoni* Bolus, ospite dell' *Alternaria porri* (Ell.) Neerg. f. sp. *solani* (E. & M. pro sp.) c.n. **(*Gerbera jamesoni*, a host of *Alternaria solani*.)** [English summary ½ p.]
Bol. Staz. Pat. veg. Roma, 1954, **12**: 183-98, bibl. 18, illus.

In greenhouse and field tests bordeaux mixture gave little control of *Alternaria* leaf spot, but captan (N-trichloromethylthiotetrahydrophthalimide) was promising.

4198. PUGSLEY, H. C.
***Lobelia cardinalis* × *L. syphilitica* hybrids.**
J. roy. hort. Soc., 1955, **80**: 282-3, illus.

The results are described of recent breeding experiments designed to obtain various coloured varieties of lobelia with hybrid vigour.

4199. HELLMERS, E.
Bacterial leaf spot of African marigold (*Tagetes erecta*) caused by *Pseudomonas tagetis* sp. n.
Acta Agric. Scand., 1955, **5**: 185-200, bibl. 9, illus.

A disease of African marigolds in Denmark was found to be caused by a new species of bacterium, for which the name *Pseudomonas tagetis* is proposed. Affected leaves are deformed and covered with brownish black or black, irregular spots. The most important source of infection is contaminated seed. It is recommended that seed should be harvested only from carefully selected healthy plants. Transmission can be checked by spacing the plants widely and keeping them as dry as possible. Spraying with 0·1% Mercusan or 0·75% Midol-Special-Mercuri (both containing phenyl mercury compounds) affords some protection against spread of the disease.—Roy. vet. agric. Coll., Copenhagen.

4200. VALENTINE, D. H.
Studies in British primulas. IV. Hybridization between *Primula vulgaris* Huds. and *P. veris* L.
New Phytol., 1955, **54**: 70-80, bibl. 9.

An account is given of hybridization between *P. vulgaris* and *P. veris*, with special reference to seed compatibility, i.e. the degree of success or failure of seed formation in these interspecific crosses. [See also *H.A.*, 22: 4148.] —Univ. Durham.

4201. STINSON, R. F., AND LAURIE, A.
The effect of light intensity on the initiation and development of flower buds in *Saintpaulia ionantha*.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 459-67, bibl. 18, illus.

A study of the stages of flower bud initiation and development in *Saintpaulia ionantha* showed that the sequence was acropetal, the sepal primordia of the first flower of the inflorescence being the first organs to differentiate. Floral initials and evidence of branching of the inflorescence were found in plants exposed to light intensities of 500 f.c. or higher, but not in plants exposed to light intensities of 100-300 f.c. This fact suggests that reduced photosynthetic activity has an inhibiting influence on floral initiation in *Saintpaulia*. In this species the conditions favourable for floral initiation seened to be identical with those for floral development. It is concluded that, when other environmental conditions are favourable, failure to flower in *Saintpaulia ionantha* is due to insufficient light for initiation and development of flowers.—Univ. Conn., Storrs, and Ohio St. Univ., Columbus.

4202. Cooper, C. C., and Watson, D. P.
Influence of root temperature and light intensity on flower bud development in *Salvia splendens*.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 437-40, bibl. 4, illus.

Root temperature had little effect on the time of flower bud initiation in *Salvia splendens*. Flower bud development, however, was slower at 50° than at 70°F. root temperature. At the time of flowering plants grown with the 70°F. root temperature were 3 times the height of those grown at 50°F. root temperature. A reduction in light intensity from 100% to 63% daylight had little effect on the time of flower bud initiation and none on the rate of flower bud development. [See also *H.A.*, 25: 3097.]—Mich. St. Coll., E. Lansing.

4203. Lunt, O. R., Kofranek, A. M., and Hart, S. A.
Tolerance of six stock (*Matthiola incana*) varieties to saline conditions.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 431-6, bibl. 7.

Six varieties of stocks were grown out of doors in salinized soil in asphalt-coated metal containers. All varieties were moderately salt tolerant. Basal leaves became chlorotic when grown in a soil with an ECe [electrical conductance of an extract of a saturated soil expressed as millimhos per cm.] of about 7. Plants at that salt level were about 25 to 30% shorter than plants grown at an ECe of about 2. Treatments had little or no effect on the dry weight or flowering date of the plants. The concentration of bases in plants grown at high salt levels was about 70% greater than in those grown at low salt levels. The tolerance of stocks to calcium and sodium chlorides appears to be related to the ability of the plant to accumulate appreciable quantities of sodium and chloride ions without suffering excessive deleterious effects. It is concluded that stocks may be grown successfully under moderately saline conditions produced by calcium and sodium chlorides. [Authors' summary.]—Univ. Calif., Los Angeles.

4204. Konovalov, I. N.
Experiments on increasing the frost resistance of stock and cabbage by treatment with extracts from winter-hardy plants. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1955, **101:** 767-70, bibl. 11, illus.

Results of the experiments described show that treatment of stock [*Matthiola* sp.] and cabbage seeds with leaf extracts of *Bergenia crassifolia* greatly increased the frost resistance of both species. Stock raised from treated seed survived temperatures down to −12°C. The carbohydrate content and the oxidizing-reducing activity of the treated plants were higher than those of the controls. The best results were obtained when the *B. crassifolia* leaf extract was diluted in water in the ratios 1:4-6 in the spring and 1:15-18 in the autumn and winter and applied for 24 hrs. Foliar treatment with the extract applied to 2-3 week-old seedlings at 1 l. per sq. m. produced results similar to those of the seed treatment.

4205. Strydom, J. C.
The cultivation of sweet peas.
Fmg S. Afr., 1955, **30:** 204, 208, 212.

Three groups of sweet pea varieties are grown in South Africa, the Early Spencer (winter-flowering), Late Spencer (summer-flowering), and Cuthbertson (spring-flowering). The winter-flowering varieties are the most important. Recommendations on culture include: soaking the seeds before sowing; inoculating the soil with N-fixing bacteria just before sowing; sowing the seed in the middle of a 4-5 ft. bed, previously well dug and manured; sowing in rows 6 ft. apart running N.-S.; thinning to 6 in. when about 4 in. high, followed by a N top-dressing; and removal of inferior quality flower stems which appear during the first 10 days of flowering. Some physiological diseases are described briefly.

4206. Matuura, M.
On cold resistance of sweet peas. [Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1955, **23:** 269-72, bibl. 10.

The strains Early Spencer, Spencer and Cuthbertson showed considerable differences in frost resistance. In general, frost resistance increased with increasing sugar content of leaf juice and increasing dry matter content of leaf. In 2 varieties the middle leaves were the most resistant, the lower leaves intermediate and the upper leaves the least resistant.

4207. Wegner, I. G.
Duftprüfung bei Stiefmütterchen. **(Scent tests with pansies.)**
Dtsch. Gartenb., 1955, **2:** 180-1.

In the course of variety trials with pansies a preliminary attempt has been made to include the intensity of scent among the characteristics to be evaluated. Scent was found to be most pronounced in yellow-coloured strains of the *Viola tricolor maxima hiemalis* group. Strongly and weakly scented varieties are listed.—Inst. f. Zierpflanzenbau, Berlin-Köpenick.

4208. Franklin, M. T.
Nematology Department. Chemical (and other) control methods.
A.R. Rothamsted exp. Stat. for 1954, 1955, pp. 100-1.

Warm-water treatment was given to violet plants infested with *Aphelenchoides fragariae*. Temperatures and times of the treatments given were: 112·5°F. for 10 and 15 min., 115°F. for 8, 10 and 12 min., and 117°F. for 6 and 9 min. Living parasites were found only in the controls, and slight damage to the plants was found only after 112·5°F. for 15 min.

Bulbs, tubers, etc.

(*See also* 3411, 3498s, 4065y, 4268h, m, u, w, z, 4269a, c, h, k, 4474.)

4209. Payot, M.
Une nouvelle méthode pour l'enracinement des bulbes. **(A new method for bulb rooting.)**
Rev. hort. suisse, 1955, **28:** 257-9, illus.

A Swedish method for rooting bulbs before forcing is described. Wooden boxes are packed with 60-66 bulbs which are covered by sand. The boxes are stacked in concrete "cellars" built above ground. Alleys are left for ventilation and watering. A temperature of 7-9°C. is maintained.

4210. Maatsch, R., and Rünger, W.
Über das oberirdische Wachstum und die Knollenbildung von Knollenbegonien nach kurzfristiger Kurztagsbehandlung. **(Top growth and tuber formation of tuberous-rooted begonias after short periods of short day treatment.)**
Gartenbauwiss., 1955, **1** (n.s.): 457-64, bibl. 2, illus.

Several varieties of tuberous-rooted begonia were given short-day treatment during the summer months. Both reproductive and vegetative growth of the aerial plant parts was inhibited. The inhibition was reversible after 10-25 days of treatment, but longer periods of short photoperiods caused the growing point and later the leaves and stems to die. Short-day reactions were induced by a day-length of 6-12 hours; one of 13 hours caused long-day reactions. Short-day treatment caused tuber weight to increase 1½-to 7½-fold, the most favourable length of treatment being 15-25 days. For the varieties tested, a 17-day treatment started at the end of July gave a greater increase in tuber weight than did the same treatment started at the beginning of July or in August or September.—Tech. Hochschule, Hanover.

4211. Gorter, C. J.
***In vitro* culture of cyclamen embryos.**
Reprinted from *Proc. kon. Ned. Akad. Wetensch.*, 1955, **58:** 377-85, bibl. 5, illus.

Since it was thought that the failure of crosses between certain cyclamen species might be due to embryo abortion, a study was made of the normal development of seeds and embryos of *Cyclamen persicum* and of the development of the embryos in artificial media. The following method is recommended for *in vitro* culture of the embryos: The culture medium should be Tukey's medium with 0·7% agar and 0·5% saccharose plus fresh coconut milk, peat extract or yeast extract. The embryos should be inserted about 5 mm. under the surface of the agar and the cultures should be put in dark incubators at 20-23°C. Under these conditions the embryo develops a corm, roots and a plumule in ± 14 days and can be transplanted into soil after ± 30 days.—Lab. Tuinbouwpl., Landbouwhogesch., Wageningen.

4212. Böhnert, E., and Mühlendyck, E.
Erfolge in der Bekämpfung der Fusarium-Welke bei Cyclamen durch Desinfektionsmassnahmen. **(Results of control of *Fusarium* wilt of cyclamen by disinfection measures.)**
Gartenbauwiss., 1955, 1 (n.s.): 539-51, bibl. 7, illus.

Fusarium wilt of cyclamen was controlled by soil sterilization with steam or chemicals. Larvacide, which contains chloropicrin, gave the best control and in addition caused some growth stimulation. Mercurial treatments were unsatisfactory. There was little difference in the results obtained with steam sterilization and formaldehyde. [For earlier work see *H.A.*, 24: 1769.]—Tech. Univ., Berlin-Charlottenburg.

4213. Okada, M., and Harada, H.
Effects of daylength and temperature on the ratio of ray-flowers to disk-flowers in dahlia flower heads. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **23:** 259-63, bibl. 4.

In studies on 18 commercial dahlia varieties seasonal variations in ratios of ray to disc florets were small in some varieties and very large in others. The total number of florets per head was affected by temperature but not by photoperiod. The varieties could be grouped according to their responses as follows: (1) Varieties in which the ratio is not affected by photoperiod, but is markedly affected by temperature; (2) Varieties in which the ratio is not affected by temperature but is markedly affected by photoperiod; and (3) varieties in which the ratio is affected by both factors.

4214. Wasscher, J.
De invloed van een kortedagbehandeling op de knolvorming bij dahlia's, knolbegonia's en gesneria's. **(The effect of short-day treatment on tuber formation in dahlia, tuberous-rooted begonia, and gesneria.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18:** 342-52, bibl. 6, illus.

Short-day treatment resulted in a considerable increase in tuber weight with poor tuber-forming dahlia varieties, although treated plants formed fewer flowers than did control plants. A 4-week treatment, applied between the end of July and the beginning of September, appeared to be the most satisfactory. Pot-growing and regular cutting back of the plants also promoted tuber formation, but short-day treatment was the best method for plants grown normally in the open ground. With large-flowering tuberous-rooted begonias a 3- or 4-week period of short-day treatment was more effective than longer periods for increasing tuber weight. The latter half of July to early August was the best time to start the treatment. Flower removal slightly improved tuber weight. During October there was a substantial increase in tuber weight in both treated and control plants, but treated tubers lifted at the beginning of October were larger than untreated ones lifted at the end of October. Short-day treatment of gesneria affected neither flowering time nor tuber weight.—Proefst. Bloem. Aalsmeer.

4215. Bruhn, C.
Untersuchungen über die *Botrytis*-Krankheit der Gladiolen (Erreger: *Botrytis gladiolorum* Timmermans). **(Studies on the disease of gladiolus caused by *Botrytis gladiolorum*.)**
Phytopath Z., 1955, **24:** 179-94, bibl. 35, illus.

Since about 1950 *Botrytis gladiolorum* has been causing damage to gladiolus in Germany, especially in wet years. The fungus, to which popular varieties are susceptible, was found to attack uninjured tissue in healthy plants. Symptom expression appears to be governed by climatic conditions. Illustrated descriptions are given of the development of the fungus and of the symptoms it produces under different climatic conditions. In most instances satisfactory control of corm rot was achieved by rapid and thorough drying of the corms (at 35°C.) after an early harvest, with subsequent inspection before replanting. The immediate removal of all plant refuse in summer is another control measure suggested. Fungicidal foliage sprays are unlikely to be required under German conditions.—Biol. Bundesanst., Berlin-Dahlem.

4216. Sani, G. L.
Il fiore di iride. **(Irises.)**
Riv. Ortoflorofruttic. ital., 1955, **39:** 267-82, bibl. 5, illus.

Subjects discussed include classification, principal species of rhizomatous irises and their culture and varieties, bulbous irises and their culture, breeding, rock garden, aquatic and winter-flowering species and diseases.

4217. Steffen, L., and Bünger, C. H.
Vermehrung von Lilien durch Zwiebelschuppen. **(The propagation of lilies from bulb scales.)**
Gartenwelt, 1955, **55:** 186-7, illus.

On 6 November two layers of bulb scales of several *Lilium* species were planted in boxes containing moderately moist peat and other media and were held at 18-20°C. Counts on 15 January showed that 80% of the scales had formed bulblets. The boxes were then transferred to a cool place until the end of March, after which the rooted scales were planted out in beds. Scales of *L. candidum* should be planted in boxes earlier than those of other species, preferably in July or August.—Versuchs -u Lehrwirtsch. f. Gartenbau, Kiel.

4218. Pfeiffer, N. E.
Effect of lyophilization on the viability of *Lilium* pollen.
Contr. Boyce Thompson Inst., 1955, **18:** 153-8, bibl. 7.

Pollen of 3 species and 3 hybrids of *Lilium* was subjected to lyophilization (dehydration at low temperature) for 3 hours and was subsequently stored in evacuated tubes at −20°, 0·5° or 5°C., or at room temperature for 50 to 194 days. Immediately upon removal from storage, percentage germination was very low, regardless of storage temperature. After rehydration for 5-7 days at 65% RH at 8°C., however, there was an increase in germination. Pollen of the same lots, not treated but stored at similar low temperatures with RH of 35% or less, gave far better germination than lyophilized pollen.

4219. Lock, F. W.
Technique of forcing and recovering bulbs.
Grower, 1955, **43:** 1313-15, 1375-7.

A system is described, in which narcissus bulbs are forced in one year and then planted out to recover before further forcing again in 2 years' time. After forcing the bulbs are gradually dried off and given hot-water treatment before planting outside.—Avon Nurseries, Ringwood, Hants.

4220. de Mol van Oud Loosdrecht, W. E.
Beitrag zum Problem der sogenannten Tulpendiebe. **(Contribution to the problem of rogues in tulips.)**
Angew. Bot., 1955, **29:** 38-9, bibl. 3.

The author discusses the possible origin of rogues in tulips, which are transient and persistent modifications or mutations. Work on factors conducive to these aberrations is in progress.

4221. de Mol van Oud Loosdrecht, W. E.
Der Einfluss der Röntgenstrahlen auf die Entwicklung des Pollens und der Sprosse bei Tulpen. **(The effect of X-rays on the development of tulip pollen and shoot.)**
Gartenbauwiss., 1955, **1** (n.s.): 465-91, bibl. 1, illus.

Bulbs of 16 diploid and polyploid tulip varieties were subjected to doses of X-rays for varying periods. The effects of the X-rays on reduction division in the pollen and on subsequent plant growth are described.

4222. Wood, J., Limb, P. G., and Horton, D. E.
Effect of hot water treatment on tulip bulbs.
Grower, 1955, **44:** 43-5.

Healthy tulip bulbs were immersed for 2 or 3 hours at 110°F. on 7 dates between the end of June and early August. Observation plots showed that there were varietal differences in reaction to the treatment, and that treatment too early was as unsatisfactory as that given too late. Rose Copeland was more susceptible to hot water treatment than Carrara; in both varieties injury was greater after the longer immersion. The optimum time for treatment is related to the stage of bud development within the bulb.—Kirton exp. Husb. Farm and Rosewarne exp. Hort. Stat.

Lawns.

(*See also* 3419, 3853, 4268r.)

4223. Anon.
Emerald zoysia.
Agric. Res. Wash., 1955, **3** (10): 16.

This new hybrid lawn grass is said to combine the winter hardiness, non-fluffy growth habit and fast spread of one parent (*Zoysia japonica*), with the finer leaves, denser turf and darker green colour of the other parent (*Z. tenuifolia*).

4224. Shurtleff, M. C., and Howard, F. L.
1953 turf fungicide trials in Rhode Island.
Golf Course Reptr., 1954, **22** (4): 5-9, from abstr. in *Biol. Abstr. Sect. D*, 1955, **29**, No. 12425.

Brown patch studies were conducted on 18 turf and lawn grasses against 29 strains of *Rhizoctonia solani* which proved to be quite variable in pathogenicity. In order of decreasing susceptibility the grasses were: Colonial, velvet and creeping bents, fescues, bluegrasses; Zoysia and crabgrass were highly resistant. Grasses of all ages were about equally susceptible. In hot humid weather infected areas increased 1 in. per day in grass and ⅓ in. per day in soil. Grass leaves next to soil are attacked first. Aerial mycelium spreads infection from blade to blade, through guttation water and up to 7 ft. by mower clippings. A 3-spray schedule 1 week apart of Calocure or Calochlor, 2 oz. in 10 gal. water to 1,000 sq. ft., aimed at killing or inhibiting the sclerotia, gave complete control. Fungicides containing N increased disease. *Helminthosporium vagans* on Kentucky and Merion bluegrass plots appeared early in March. On Merion the fungus did not invade the crowns and roots. 1·6 oz. of 10% phenyl mercury acetate/1,000 sq. ft. gave good control. Two chromium complexes, Krominate and MCW-A935 were effective. Merion bluegrass became severely infected with rust, recent plots more so than older ones. Phenyl mercury acetate seems to increase rust susceptibility on Merion.

4225. Manzelli, M. A.
A residual organophosphorus nematocide.
Plant Dis. Reptr., 1955, **39:** 400-4, bibl. 3.

Field work initiated in 1953 and continued through 1954 has shown that *O*-2,4-dichlorophenyl *O,O*-diethyl phosphorothioate is capable of controlling parasitic nematodes attacking turf and lawn grasses. Applied as a drench or spray, or injected into the soil at rates of 125, 250 and 500 pounds of technical grade material per acre, it has succeeded in reducing the populations of the pathogenic nematodes sufficiently to permit the grasses to regain their former vigor and growth. [Author's abstract.]—Virginia-Carolina chem. Corp., Richmond, Va.

4226. Tarjan, A. C., and Cheo, P. C.
Reduction of root-parasitic nematode populations in established bent grass turf by use of chemical drenches.
From abstr. in *Phytopathology*, 1955, **45**: 350.

The most effective nematocides among 4 compounds applied to turf at 50 gal. per 100 sq. ft. were V-C 1-13 (a neutral ester of phosphorothioic acid) at 500 and 250 lb. per acre and heptachlor at 300 lb.

Succulents.

(*See also* 3452, 4269f.)

4227. (Buxbaum, F.)*
New ways in cactus culture.
Nat. Cactus Succ. J., 1955, **10**: 38-9, illus.

Two aspects are discussed. (1) The author's experience indicates that many cactus species will only grow successfully in an acid medium. The ill-effects of watering with alkaline tap-water can be avoided if this is acidified to about pH 6·5 with nitric acid. Given a suitably acid medium there should be no need to graft certain species onto lime-tolerant rootstocks. (2) Experience has also shown that certain epiphytic cacti, which were thought to need a moist atmosphere, can be grown successfully in hydroculture under dry air conditions. These cacti also need acid media, but these conditions can be readily maintained by using a water-retentive medium such as peat-moss and by ensuring that any water and nutrient solutions applied are acidified to pH 5·5 to 6·0.

4228. Taguchi, R.
Physiological reactions of some succulent plants to photoperiodic changes. [Japanese, with English summary ¾ p.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951, **13**: 26-31, bibl. 16 [received 1955].

Under short-day conditions, as compared with normal and long-day conditions, the leaves of *Sedum kamtschaticum* and *Bryophyllum calycinum* are smaller, thicker and more succulent, the dry matter content, osmotic pressure and specific electrical conductivity of expressed leaf juice are much lower, and the specific gravity, hygroscopic capacity, and the dry matter content of tissue powder and the corrected concentration index (dry matter content × water content of plant) of the expressed juice are much greater.—Shinshu Univ., Ueda.

4229. Schwabe, W. W.
Photoperiodic cycles of lengths differing from 24 hours in relation to endogenous rhythms.
Physiol. Plant., 1955, **8**: 263-78, bibl. 18.

The effect of light breaks on the flowering of *Kalanchoë blossfeldiana*, when given at different times during the 60-hour dark period of a 72-hour cycle, was a significant reduction in flower number, when the light breaks coincided with Bünning's three unfavourable phases,* but the reduction during the second of these—though statistically significant—was only slight. Under the same conditions *Xanthium pennsylvanicum* flowered in all treatments. In another experiment carried out in Arctic Lapland three short-day species (*Xanthium*, *Kalanchoë*, and a short-day variety of *Impatiens balsamina*) were given photoperiodic cycles comprising nine factorial combinations of 5, 10 and 20 hours' light with 10, 20 and 30 hours' darkness. Flowering occurred in cycles whose lengths differed widely from 24 hours, and failure to flower could be attributed either to the dark period being too short or, in *Kalanchoë*, to excessive length of the light period. The results are discussed critically in relation to Bünning's hypothesis of endogenous diurnal rhythms which, it is concluded, cannot account for all photoperiodic responses.—Imp. Coll. Sci. Tech., London.

4230. Younis, A. F.
Studies on the photoperiodism of *Kalanchoë blossfeldiana*. (I.) Effect of age on response to short-day treatment. (II.) A. Flowering of Dutch variety. B. Flowering of cuttings under short-days.
Physiol. Plant., 1955, **8**: 223-9, bibl. 10, illus., and 230-7, bibl. 5.

Old plants did not flower under long-day conditions or when given 4 short-day cycles of 9 hours light per day but they flowered with abnormal inflorescences when given 5-7 cycles and with normal inflorescences when given 10 or more. Increasing the number of cycles gave increasingly earlier flowering in 45-week-old plants.

The Dutch variety flowered under short-day conditions only, the critical day-length being 11½ hours. Cuttings of the common variety showed a marked delay in response to the photoperiodic stimulus, especially when the stimulus was applied during the second or third week following planting. The delay in photoperiodic response may be due to a deficiency of mineral salt supply or to a decrease in the water content of the plant. [From author's summaries.]—Dep. Bot., Fac. Sci., Alexandria, Egypt.

Roses.

(*See also* 3794, 4268g, 4269i, m, n, 4475.)

4231. Leroy, A., and others.
Les roses. **(Roses.)**
Bull. hort. Liège, 1955, **10**: 219-63, illus.

This issue of the journal is devoted entirely to roses. It includes articles by experts from several countries on the history, botany and varieties of roses, soil and water requirements, pruning, budding, culture under glass and outside, pest and disease control, and breeding and other methods of producing new types.

4232. Thomson, R., and others.
Roses.
Brooklyn bot. Gdn Rec., 1955, **11**: 98-176, illus., available as a separate $1.

The whole of this number of the journal is devoted to roses. Articles by a number of authorities deal with culture under various conditions, pruning, breeding, propagation from softwood cuttings, types of roses, species, old-fashioned and miniature roses, and varieties.

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* Adapted by R. J. Gledhill from paper read at 2nd Congr. I.O.S., Monaco, 1953.

* *Surv. biol. Progr.*, 1952, **2**: 105.

4233. Tantau, M.
Die Rosenneuheiten—Bewertungssysteme und Methoden in Westdeutschland und einigen weiteren Ländern. **(Methods of testing new rose varieties in Western Germany and some other countries.)**
Dtsch. Gartenb., 1955, **2:** 194-6.

Methods of evaluating new varieties of several types of rose are discussed, with special reference to Western Germany, Great Britain, the United States, France and Switzerland.

4234. Langhans, R. [W.]
Mist starts roses.
Bull N.Y. St. Flower Grs, 1955, No. 115, pp. 1, 4, illus.

Greenhouse roses were planted in December, March, May and July and were started into growth with either normal hose watering or mist spray. Growth data were recorded after 2 months. Growth was always greater in the mist treatments, the plants producing more breaks and longer shoots. The fresh and dry weights of the misted plants started in May and July were about twice as great as those from the non-misted plants. The greatest increase due to mist was with the July planting when misting also resulted in better survival. Disease was not observed on any of the misted plants but mildew occurred on the non-misted plants started in July.—Cornell Univ.

4235. Langhans, R. W.
Mist equipment for starting roses.
Bull. N.Y. St. Flower Grs, 1955, No. 116, pp. 3-4, illus.

An intermittent mist spray is recommended for starting roses into growth during the summer months. A diagram shows the equipment needed for applying mist to a 200 ft., 8 bench house, and notes are given on suitable types of nozzle, pipe size, pressure, solenoid valves, strainers and timers.—Cornell Univ.

4236. Chandler, E. L., and Watson, D. P.
Contributions of various light intensities to the growth and yield of greenhouse roses.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 441-7, bibl. 27, illus.

Total plant weight of greenhouse Better Times roses was greatly reduced by a 65% decrease in light intensity, but very little growth reduction occurred with a 42% decrease in light intensity. The number of flowers produced increased with increased radiation. Soil surface covers which increased the amount of reflected light increased plant growth only when radiation was extremely high and the plants were very small. Leaf structure was greatly modified by the degree of light intensity, heavily shaded plants having thinner leaves with a much lower chlorophyll content than plants grown in full sunlight. There was a great increase in total sugars in leaf and stem tissue during periods of intense heat and extremely high radiation. Translocation, respiration or other utilization of carbohydrates appeared to take place rapidly when one day of low solar radiation was followed by one of high solar radiation.—Mich. St. Coll., E. Lansing.

4237. Farmer, R., and Holley, W. D.
The effect of partial shading on the quality and production of Better Times rose.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 448-58, bibl. 13.

Various light intensities were provided for Better Times roses in the greenhouse by the following treatments: (a) unshaded glass (control), transmission reduced by 10%; (b) glass shaded by 1 thickness of cheesecloth, transmission reduced by 50%; (c) glass shaded by 3 thicknesses of cheesecloth, transmission reduced by 75%; (d) Aklo-hammered glass, transmission reduced by 50% and quality of visible and infra-red light affected. The effects of these treatments on colour, stem length, stem diameter and number of flowers were studied. There was very little difference between the effects of 1 thickness of cheesecloth and the control treatment on any of these factors. Three thicknesses of cheesecloth were detrimental to stem diameter and yield. Aklo-glass was detrimental to stem diameter, colour and yield. The greatest stem length and diameter and the highest yields occurred during the autumn and spring months. Periods of high temperature preceding flowering appeared to be detrimental to flower colour. It is concluded that under the conditions of this experiment light intensity had very little effect on the quality and quantity of production, provided it was not reduced below 50% full sunlight and the quality of light was not changed.—Colo. A. & M. Coll., Fort Collins.

4238. White, H. E.
Response of roses and gardenias to treatment with chelated iron and a chelating agent.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 423-30, bibl. 7, illus.

In these preliminary investigations, iron complexed as mono-sodium ferriethylenediamine tetraacetate dihydrate was effective in correcting symptoms of iron chlorosis in roses and gardenias. This material in a dry form was applied to soil at the rate of 4 to 24 oz. per 100 sq. ft. of soil surface area. The interval of time between date of application and plant response varied from 3 to 7 weeks. Foliar application of iron chelate at the rate of 2 lb. per 100 gal. of water caused injury to the young growth of roses but not to gardenias. No improvement of foliar color was observed to result from foliar treatments. Responses of roses and gardenias to the chelating agent (tri-sodium ethylenediamine tetraacetate) were as good as their responses to iron chelate. [Author's summary].—Univ. Mass., Amherst.

4239. (Taylor, E. A., Smith, F. F., and McClellan, W. D.)
New multipurpose rose dusts.
Agric. Res. Wash., 1955, 3 (12): 12-13, illus.

In trials at Beltsville, Md, certain combinations of chemicals, applied as dusts, were found to control simultaneously aphids, leafhoppers, blackspot, mildew and spider mites on roses. They did not control thrips or adult Japanese beetles. The 6 most effective mixtures all contained 5% DDT and 1% lindane as insecticides, plus one of the following fungicide-acaricide combinations: (1) 3·4% copper, 25% sulphur, 1·5% aramite; (2) 3·4% copper, 25% sulphur, 4% malathion; (3) 7·6% ferbam, 25% sulphur, 1·5% aramite; (4) 7·6% ferbam, 1% karathane, 1·5% aramite; (5) 6% zineb, 1·5% aramite; (6) 6% zineb, 1% karathane, 1·5% aramite.

Other trees and shrubs.

(*See also* 3453, 4171, 4268b, d, e, k, l, n, s, x, 4269b, l, o, 4477.)

4240. CARRA, P., THEAU, —., AND BENAZOUZ, —.
Arbres d'alignement et de jardin. (**Avenue and garden trees.**)
Rev. hort. Algér, 1955, **59:** 55-64, 88-94, 117-29, 147-61, illus.

Notes are given on a large number of palms, conifers, broad-leaved evergreens and bamboos suitable for avenue and garden planting in Algeria. In addition to descriptions information is given on varieties, ecology, propagation, planting, spacing, maintenance and uses.

4241. BOSKOOP.
Jaarboek uitgegeven door het Proefstation voor de Boomkwekerij te Boskoop 1954.
(**Yearbook of the Boskoop Tree and Shrub Nursery Experimental Station, 1954**), [1955], pp. 130, illus.

In addition to reports of experiments on woody ornamental plants abstracted separately, accounts are given of work on diseases, propagation and rootstocks, breeding and selection, and soils and manures.

4242. SAX, K.
Plant breeding at the Arnold Arboretum.
Arnoldia, 1955, **15** (2): 5-12, illus.

Descriptions are given of some promising hybrid ornamental cherries, apples, magnolias and forsythias produced at the Arnold Arboretum. Plant breeding methods used there include the production of triploids and aneuploid seedlings, and exposure to ionizing radiation to increase mutation rate. The need for smaller trees has stimulated work on dwarfing techniques: *Malus sargenti* and other apple species are being tested as dwarfing stocks for ornamental crabs; preliminary tests indicate that the Silver maple is a useful dwarfing stock for the Red and Crimson King maples; and bark ring inversion has been shown to induce dwarfing and earlier flowering.

4243. DE BOER, S.
Stekproeven. (**Experiments with cuttings.**)
Jaarb, Proefst. Boomkw. Boskoop 1954, pp. 20-1.

Cryptomeria japonica "Bandai-Sugi" cuttings gave 80% rooting after dipping in 25 mg./l. NAA. *C. japonica* "Jindai-Sugi" gave 70% rooting after treatment with 25 mg./l. IBA. *Erica carnea* "Vivelli": cuttings treated with 2% IBA gave 93% rooting in a double frame, and untreated cuttings 87% in a glasshouse. With *Paeonia suffruticosa* 60% rooting occurred in side shoots, whether untreated or treated with 0·1% NAA; "eye" cuttings gave poorer rooting. 2, 4, 5-TP was compared with IBA at 2 concentrations for rooting "hard" cuttings of 3 rhododendron hybrids; rooting was not very good, and 2, 4, 5-TP was less effective than IBA. [See also *H.A.*, 25: 3140.]

4244. DORSMAN, C., AND RAVENSBERG, K.
Stekken onder waternevel. (**Mist propagation of cuttings.**)
Jaarb. Proefst. Boomkw. Boskoop 1954, pp. 21-45, illus.

Better and quicker rooting of several ornamentals was obtained in a glasshouse with mist than under double glass without mist. The difficult-rooting *Berberis lologensis* variety Highdown and *Chaenomeles japonica* var. *simonii* rooted well. Azaleas and other *Rhododendron* spp. tested did not do well under the mist, due to the hardness of the water used. Poor results were also obtained with the conifers tested. Further experiments showed that interrupted mist (5 min. mist at 25 min. intervals) gave better rooting and leaf appearance than continuous mist. Sand and peat-sand rooting media gave variable results with different species. Hormones improved rooting. Softer cuttings than normal survived without rotting under mist. The mist unit used is described with the aid of a plan.

4245. ZEIGER, F.
Bewurzelungsversuch mit Airwrap. (**Rooting trial with Airwrap.**) [English, French, Spanish summaries 3 lines each.]
Mitt. Klosterneuberg. Ser. B, 1955, **5:** 146-7.

In a preliminary trial started on 30 June the ringing of 1·5 cm.-thick shoots just under a bud followed by rubbing the wound with the green [hormone-impregnated?] side of Airwrap film, putting moist sphagnum moss around the treated part of the shoot and wrapping the moss with the film led to 80% rooting of *Paeonia arborea*, but *Tecoma radicans* and *Viburnum carlesii* did not respond so well.

4246. DE BOER, S.
Het beschermen van winterstekken tegen uitdrogen. (**Protecting hardwood cuttings against drying out.**)
Jaarb. Proefst. Boomkw. Boskoop 1954, pp. 99-100.

Cuttings of *Cotoneaster*, *Cornus* and *Philsdelphus* spp. were taken in March, and one group was covered by a polyethylene tent until the end of May. Better rooting was obtained with *Cotoneaster* and *Philadelphus* under the tent, but the *Cornus* cuttings were burnt.

4247. ANDERSON, Y. O.
Seasonal development in sun and shade leaves.
Ecology, 1955, **36:** 430-9, bibl. 22, illus.

The development of sun and shade leaves was traced from the initial stages in the bud to the fully mature leaf, and the effects of temperature and light on their developmental morphology were studied. The test plants used were *Cornus florida*, which appears to grow equally well in sun and shade, and *Viburnum prunifolium*, which attains maximum vigour and size in an open situation.

4248. BROERTJES, C.
Trekproeven met forsythia, Japanse azalea en *Prunus triloba.* (**Forcing tests with forsythia, Japanese azalea and *Prunus triloba.***)
Jaarb. Proefst. Boomkw. Boskoop 1954, pp. 76-8.

For a previous report on forsythia forcing see *H.A.*, 25: 3151. The Japanese azalea "Palestrina" flowered before Christmas when the plants were cooled for 4 weeks from mid-October to mid-November at 2°C. and given additional light (100 w./sq. m.) while being forced. Plants of *Prunus triloba* flowered best after cold storage for 5 weeks at 2°C.

4249. Kosugi, K., and Kondō, H.
Studies on flower bud differentiation and development in some ornamental trees and shrubs. V. On the time of flower bud differentiation and flower bud development in *Chaenomeles extus-coccine* Car., *Rhododendron obtusum* Planch and *R. oomurasaki* Makino. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1955, **23:** 264-8, bibl. 14, illus.

In the Tōyōnishiki variety of *Chaenomeles extus-coccine* flower bud initiation occurred during September in lateral buds of 2-year-old shoots. Petal and stamen formation was observed on 7 October and pistil formation on 17 October. Flowering started on 27 October and continued to the end of March. In the azalea Beni-giri (*R. obtusum*) cluster initiation in terminal buds of the current season's shoots was observed on 20 June, individual flower differentiation on 10 July, pollen and ovule formation on 18 September and flowering on 10 April onwards. The azalea Oomurasaki showed similar though rather later development, the comparable dates being 20 July, 30 July, 18 October and 27 April.

4250. Egberts, H.
Ontbladering van boomkwekerijgewassen met chemische preparaten. **(Defoliation of woody ornamentals with chemicals.)**
Jaarb. Proefst. Boomwk. Boskoop 1954, pp. 105-7.

Defoliation of *Forsythia intermedia spectabilis* was achieved in a cold house with D.F. Liquid and Dina (disodium 3,6 endoxohexahydrophthalate). Sprays applied outside in October to *Callicarpa*, *Syringa*, *Cornus alba*, *Weigelia*, *Magnolia* and *Spirea* gave unsatisfactory results.

4251. Gesell, S. G.
Insect pests of evergreens.
Circ. Pa agric. Ext. Serv. **449,** [1955?], pp. 21, illus.

The damage done by, and control of, insects and mites attacking the following evergreens is described briefly: arborvitae, box, euonymus, fir, hemlock, holly, juniper, larch, laurel, pine, rhododendron, spruce and yew. Notes are supplied on 13 insecticides and acaricides, and a spray and dust dilution chart is provided.

4252. Schread, J. C.
Scale insects and their control.
Bull. Conn. agric. Exp. Stat. **578,** 1954, pp. 23, illus.

The results are reported of several years' experiments on the control of the following species of scale insect and mealy bug: Arborvitae soft scale (*Lecanium* sp.) on *Taxus hatfieldi*; soft brown scale (*Coccus hesperidum*) on camellia, stephanotis and ivy; euonymus scale on euonymus; cottony taxus scale (*Pulvinaria floccifera*) on *Taxus*; oystershell scale on lilac; pine-leaf scale on *Pinus montana*; azalea bark scale on azalea; *Pseudococcus* sp. on *Taxus* and *P. adonidum* on several ornamentals under glass and out-of-doors. Various contact and systemic insecticides proved satisfactory, but malathion is singled out for special recommendation against all the species studied.

4253. Wells, J. S.
The rooting of chaenomeles.
Amer. Nurserym., 1955, **101** (11): 11, 59-66, illus.

Tests were carried out in Illinois to determine the possibility of rooting chaenomeles hybrids from softwood cuttings. An intermittent fogline was used in the greenhouse and 3 types of constant mist were used in the open. Several growth substances were tested. The cuttings were taken on 23 June and placed in a coarse sharp sand medium. Greenhouse propagation proved a complete failure owing to inadequate mist application. Outdoor propagation was generally successful, but it is considered that intermittent mist might give even better results. Growth substance treatment was necessary to prevent leaf drop and induce rooting. Best results were obtained with fairly large cuttings, 6-10 in. long, and moderately strong hormone treatment. In most cases 1% potassium salt of IBA resulted in the best rooting. Recommendations are made on hardening off from mist, potting up and overwintering in deep frames. It is suggested that chaenomeles cuttings should be grown on and sold in containers rather than planted out in nursery fields.

4254. Alvey, N. G.
Adapting John Innes composts to grow ericas.
J. roy. hort. Soc., 1955, **80:** 376-81, bibl. 4, illus.

Experiments are described in which the JIS and JIP composts, and various modifications of these, were compared with growers' composts containing a large proportion of rhododendron peat for growing *Erica gracilis*. Data are recorded on growth, flowering and severity of chlorosis. On the basis of the results obtained it is recommended that ericas be grown in a JIS compost in which chalk is replaced by the same weight of sulphur. This compost should be prepared from a loam standardized in the stack at a pH of 6·3. It is proposed to call this compost JIS(A). Feeding at fortnightly intervals with John Innes L feed at ½ oz. per gal. after the plants are stood out is also recommended. If the pH rises, owing to the use of hard water, watering with ferrous sulphate at ½ oz. per gal. is a satisfactory corrective. Other calcifuge species are being tested in JIS(A), and results so far obtained indicate that this compost will also be suitable for rhododendrons.—John Innes hort. Instn, Bayfordbury, Herts.

4255. Osterwalder, A., Schütz, F., and Vogel, W.
Ursache des Ericasterbens. **(A cause of death in ericas.)**
Schweiz, Gärtnerztg, 1955, **58** (27): 1-4, illus.

This disorder is possibly caused by *Olpidium* sp., which is often found in the epidermal cells of the fine roots. Inoculation of healthy plants with extracts from olpidium-sick erica roots induced severe growth reduction and death. Erica cuttings do not transmit this disease, which is soil-borne.

4256. Wester, H. V., and Marth, P. C.
3-Cl-IPC found effective for removal of ginkgo fruits.
Arborist's News, 1954, **19** (10): 83, from abstr. in *Biol. Abstr. Sect. D.*, 1955, **29**, No. 14663.

Applied 12 days after flowering at rates of 250, 500 and 1,000 p.p.m. as a spray Cl-IPC completely arrested further fruit development. No foliage or twig injury resulted.

4257. Link, C. B., and Shanks, J. B.
Studies of the factors involved in terminating the rest period of hydrangeas.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 519-25, bibl. 5.

Experiments were conducted on factors involved in terminating the condition of rest in greenhouse hydrangeas. Under the conditions of the experiments light during the storage period had no influence on the termination of dormancy or on plant development. A storage temperature of 40°F. was found to be as effective for both the reduction of forcing time and production of long stems as a temperature of 34°F. Higher temperatures up to 55°F. required a longer period of time to produce the same results. Decreases in the time required for forcing were obtained with storage periods up to 30 days with the variety Strafford and up to 49 days with the variety Europa. The application of nitrogen prior to cold storage treatment decreased the number of days required for forcing and was more effective when the storage treatment was begun early. The application of nitrogen prior to cold storage and the early initiation of the cold storage treatment resulted in shorter stems and smaller inflorescences. Longer periods of cold storage resulted in longer stems and larger inflorescences. [Authors' summary].—Univ. Maryland, College Park.

4258. van Lint, H.
Proeven met seringen onderstammen. **(Tests with lilac rootstocks.)**
Jaarb. Proefst. Boomwk. Boskoop 1954, pp. 64-7.

Syringa vulgaris vars. Andeken an L. Späth and Mme Lemoine were grafted on 5 rootstocks. With both varieties the best take and growth were obtained on *S. tomentella*, *S. josikaea* and *S. reflexa*.

4259. Wasscher, J.
Bloeibeïnvloeding en abnormale bloemvorming bij de sering als gevolg van ontbladering. **(The effect of defoliation on flowering and abnormal flower formation in lilac.)** [English summary 7 lines.]
Meded. Dir. Tuinb., 1955, **18:** 401-7, bibl. 7, illus.

In 1945 groups of the lilac variety Mme Florent Stepman were defoliated at weekly intervals from 4 June. Those treated between then and 9 July showed all morphological transitions between vegetative and generative stages. Plants treated on the 17 and 24 July flowered almost normally 6 weeks later. The most normal flowering occurred in the group defoliated on the 30 July. Plants treated after this did not complete their development because of low temperatures.

4260. Grant, W.
Lonicera splendida.
Gdnrs' Chron., 1955, **138:** 35-6.

A beautiful honeysuckle but very rare in Britain. Experience has shown that it is not tender and can withstand 30°F. of frost. The reason for its rarity is the difficulty of propagating it from cuttings. The author has been successful in rooting cuttings taken from side shoots produced in spring when they were 2½-3 ins. long. These cuttings were inserted, without trimming, in sand and sphagnum in a closed propagating case and given a bottom temperature of 65-70°F. In 3-4 weeks they had rooted well. Attempts to propagate the plant from seed failed.

4261. Soukop, J.
Die Verwendung von Stimulatoren bei der vegetativen Vermehrung von Magnolien. **(The use of growth substances for the vegetative propagation of magnolias.)**
Dtsch. Gartenb., 1955, **2:** 224-6, illus.

The immersion of soft-wood cuttings for 24 hours in 0·01% growth substance solutions (indolebutyric acid plus either indoleacetic acid or nicotinic acid at 50 mg. of each compound per litre of water) induced a high percentage of rooting in five species of *Magnolia.* Some rooting also occurred in the untreated controls, provided the cuttings were taken at the right stage, which, however, proved difficult to judge. The treatment also increased the percentage survival of rooted cuttings—Hort. Res. Inst. Pruhonice, Czechoslovakia.

4262. Tagaki, T.
Morphological polarity in poplar stem cuttings. [Japanese, with English summary ½ p.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951 **13:** 248-53, bibl. 11 [received 1955].

Applications of 1 and of 5, but not of 20, mg. α-NAA per g. lanolin to the apex of normal, non-inverted *Populus alba* cuttings with all leaves and buds removed caused rooting at the apex and budding at the base. Similar applications to the base of inverted cuttings caused budding at the apex and rooting at the base.

4263. de Boer, S.
Bestrijding van schurft op *Pyracantha.* **(Scab control on *Pyracantha.*)**
Jaarb. Proefst. Boomwk. Boskoop 1954, pp. 15-17.

Aaventa (organic mercury) sprays applied within 4 days of infection prevented attack by scab (*Fusicladium pyracanthae*) without affecting the plants adversely.

4264. Doorenbos, J.
Shortening the breeding cycle of *Rhododendron.* [Dutch summary.]
Euphytica, 1955, **4:** 141-6, bibl. 1, illus.

Exposure to long photoperiods induced earlier bud break in rooted cuttings of *Rhododendron catawbiense album*, the time being shortened with each increase in photoperiod up to 24 hours. Exposure to 18- and 24-hour days, at temperatures of 15° and 20°C., did not result in continuous growth but increased the number of growth flushes in rhododendron, in azalea seedlings (*R. japonicum* × *R. molle*) and in hybrids between the two groups. As a result the treated plants grew about twice as fast as those exposed to natural photoperiods and also flowered much earlier. The use of this method to shorten the interval between generations in a breeding programme is being investigated.—Lab. Tuinbouwpl., Wageningen.

4265. Penningsfeld, F.
Verwendbarkeit bayerischer Torfe im Gartenbau. II. Teil. Azaleenkultur in Torf. **(The use of Bavarian peats in horticulture. II. Azalea culture in peat.*)**
Reprinted from *Mitt. Moor-u. Torfwirtsch.*, 1953, Heft 4/6, pp. 33-81, bibl. 6, illus.

Up to now azaleas have been grown in Germany in soils consisting of litter from pine forests. In view of the shortage of this material studies were made on the response of azaleas to certain Bavarian peats which are abundant and would constitute a cheaper growing medium. The preliminary, fully documented results of a detailed investigation indicate that peat is not only a satisfactory substitute for pine wood litter but preferable to it in some respects: Plants grown in fertilized peat may be more vigorous and may flower more profusely at an earlier date. Owing to the water-holding capacity of peat, moreover, the time needed for watering the plants in summer is greatly reduced, though care must be taken in winter to avoid waterlogging. The pH value of the peats tested was so low that the optimum (4·0-4·5) was not exceeded even if hard tap water was used. A pH value that is too low may induce "blue tip", a disorder of the foliage associated with stunted growth which is cured by liming. Settling of the medium in the second year, which may cause bad aeration resulting in chlorosis, does not occur in peat containing much fibre.—Staatl. Lehr-u. Forsch Anst. f. Gartenbau, Weihenstephan.

* For Part I see *Ibidem*, 1952, Vol. 2, Heft 3/5.

4266. Furuta, T., and Bell, C. W.
Azalea fertilization.
Bett. Crops, 1955, **39** (5): 21-4, 48-9, illus.

Three varieties of Kurume azalea, *Rhododendron obtusum japonicum*, were grown in sand culture and given differential nutrient treatments. Control plants, which received the complete nutrient solution, were more vigorous and a better colour than most commercially grown plants. Plants which received nutrient solutions deficient in N, P, K, Ca, Mg, S, Fe or B developed deficiency symptoms and these, together with observations on growth, are described in the chronological order of appearance. In another experiment rooted cuttings were grown in pots in the greenhouse, using a mixture of ¼ peat and ¾ sand. Of 9 different fertilizer combinations applied at 0 to 12,000 lb. per acre per year, 6,000 lb. of a 6-10-4 mixture was the best. In separate tests additions of minor elements to 2,000 lb. of a 6-10-8 mixture did not, in most cases, prove beneficial, and the use of sawdust or peanut hulls as a source of organic matter was detrimental at this level of fertilization.—Ala. Polytech. Inst., Auburn.

4267. Palmer, L.
Sweet box (*Sarcococca confusa*).
J. roy. hort. Soc., 1955, **80**: 328.

A record of the successful use of sweet box as a hedge plant. It is slow growing so only suitable for dwarf hedges. It flowers during January-March and has a strong fragrance. It should be clipped immediately after flowering and can be propagated from cuttings or seed.

Noted.

4268.

a Abbiss, H. W.
The production of hardy out-of-season flowers for cutting.
J. roy. hort. Soc., 1955, **80**: 309-17.
Some practices in the south-west of England.

b Anon.
Forcing shrubs for cut flowers.
Comm. Gr, 1955, No. 3101, pp. 1285-6, illus.
Dutch methods described.

c Anon.
The up and coming *Saintpaulia*.
Comm. Gr, 1955, No. 3104, pp. 1449-51, illus.
Varieties and culture.

d Baweja, G. S.
These are the days of hedges.
Indian Fmg, 1955, **5** (2): 31-3, illus.
Species and their culture in India.

e Białobok, S.
Badania systemu korzeniowego topoli. **(Investigations on the root systems of poplars.)** [English and Russian summaries ½ and ¾ p.]
Prace Zakł. Dendrol. Pomol. Kórniku, 1952, pp. 116-25, bibl. 18, illus. [received 1955.]
Mostly ornamentals.

f Böhmig, F.
Warum so wenig Platycerium? **(Why so few platyceriums?)**
Dtsch. Gartenb., 1955, **2**: 150-1, illus.
Propagation and culture of *Platycerium alcicorne* var. *major*.

g Böhnert, E. and Mühlendyck, E.
Sortenbeobachtungen an Treibrosen. **(Observations on varieties of glasshouse roses.)**
Gartenwelt, 1955, **55**: 174-6, illus.
Yields and other characteristics of 15 varieties.

h Bois, E.
Essais de nouvelles variétés de tulipes. **(Tests of new tulip varieties.)**
Rev. hort. suisse, 1955, **28**: 252-5.
Data tabulated on 38 varieties.

i Brightwell, L. R.
The squirting cucumber *Ecballium elaterium*.
J. roy. hort. Soc., 1955, **80**: 283-5, illus.
An interesting perennial suitable for coastal gardens.

j Brison, H.
Les jardins de Paris du XVIIIe siècle à nos jours. **(The gardens of Paris from the 18th century to the present day.)**
Ann. Soc. nat. Hort. France, 1955, **1** (1): 2-7, illus.

k Browicz, K.
Pnaczą w arboretun Kórnickim. **(The climbers in the arboretum of Kornik.)** [English and Russian summaries ½ and 1 p.]
Prace Zakł. Dendrol. Pomol. Korniku, 1952, pp. 3-41, bibl. 41 [received 1955].
Characters, phenology and frost resistance of ornamental climbers at Kornik, Poland.

l Bugała, W.
Spostrzeżenia dendrologiczne na terenie ważniejszych parków województwa Zielonogórskiego. **(Dendrological observations in the principal parks of Zielona Gora province.)** [English and Russian summaries ½ p. each.]
Prace Zakł. Dendrol. Pomol. Kórniku, 1952, pp. 80-115 [received 1955].
Frost resistance, vegetative and fruiting characteristics of woody ornamentals in Poland.

m Chevalier, C.
Classification horticole des bégonias. **(Horticultural classification of begonias.)**
Rev. hort. Paris, 1955, **127:** 1196-7, 1264-5, 1293-5, illus.
Tuberous, rhizomatous and fibrous-rooting, with key to species.

n Chevalier, H.
Corylopsis et *Caryopteris*. Deux arbustes méconnus. **(*Corylopsis* and *Caryopteris*, two little-known shrubs.)**
Bull. hort. Liège, 1955, **10:** 183, 188.
Characters, culture, propagation, varieties.

o Costa, L.
Le coltivazioni del garofano nel Pesciatino. **(Carnation growing in the Pescia district.)**
Riv. Ortoflorofruttic. ital., 1955, **38:** 285-92, bibl. 4, illus.
Production, marketing, varieties.

p Curtis, C. H.
A hardy maidenhair fern.
J. roy. hort. Soc., 1955, **80:** 329.
Adiantum venustum.

q Dupouy, J.
Plantes d'ornement mellifères. **(Ornamental plants for honey production.)**
Jardins Fr., 1955, **128:** 79-82, illus.
Perennials, bulbs, annuals, biennials, shrubs and trees.

r Engel, R. E.
Merion bluegrass.
N.J. Agric., 1955, **37** (2): 10-11, illus.
Notes on the leaf-spot-resistant Merion Kentucky bluegress strain. [See also *H.A.*, 24: 4123].

s G., M.
Das Pflanzen von Bäumen in Strassen und Plätzen. **(Planting trees in streets and squares.)**
Schweiz. Gärtnerztg, 1955, **59** (29): 3, illus.
Small paving stones recommended as surface surrounds.

t Garthwaite, J. M.
Gerbera will flower all the year round.
Grower, 1955, **44:** 82-3, illus.
Growing in gentle heat for cut flowers.

u Ingwerson, W.
Lilium mackliniae.
Gdnrs' Chron., 1955, **138:** 35, illus.
The Manipur lily, a promising new garden introduction.

v Johnson, B. L.
Effect of crossovers and other genetic phenomena on deterioration in percentage of doubles in eversporting lines of *Matthiola incana* (L.) R. Br.
Proc. Amer. hort. Soc. Sci., 1954, **64:** 503-18, bibl. 12.

w Keenleyside, W. J.
Propagating by electricity.
Comm. Gr, 1955, No. 3104, p. 1455, illus.
Bottom heat (about 50°F.) for dahlia cuttings.

x Krüssmann, G.
Zur Benennung der Berberis. **(On the naming of berberis.)**
Dtsch. Baumsch., 1955, **7:** 201-11, bibl. 6, illus.
Illustrated descriptions of many *Berberis* spp.

y Mayer, A.-C.
Cineraria multiflora nana maxima race Moll. **(*Cineraria multiflora nana maxima* variety Moll.)**
Rev. hort. suisse, 1955, **28:** 255-7, illus.
A Swiss variety described.

z Miller, P. R.
Virus diseases of gladiolus in the United States.
FAO Plant Prot. Bull., 1955, **3:** 122-4, bibl. 1.
Types, symptoms, effects, transmission and control by roguing.

4269.

a Ministry of Agriculture London.
Narcissus flies.
Adv. Leafl. Minist. Agric. Lond. **183**, amended 1955, pp. 4, illus.
Merodon equestris and *Eumerus* spp.

b Miyajima, H.
On rooting cuttings of different races of *Cryptomeria japonica*. [Japanese, with English summary ¼ p.]
Sci. Bull. Fac. Agric. Kyushu Univ., 1951, **13:** 277-81, bibl. 3 [received 1955].
Rooting in 5 varieties ranged from 42 to 92%.

c Nolte, H.-W.
Der Gladiolenblasenfuss. **(Gladiolus thrips.)**
Dtsch. Gartenb., 1955, **2:** 208-9, bibl. 3, illus.
Control on stored corms and in the field.

d Penningsfeld, F.
Substratwahl und Ernährung im Zierpflanzenbau. (**The nutrition of ornamental plants and the choice of growing medium for their culture.**) [English, French, Spanish summaries 9 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5:** 110-15.
A general discussion on peat, etc. [see also abstract 4265].

e Ramakrishnan, T. S.
Diseases of ornamental plants in Madras State.
South Indian Hort., 1955, **3:** 3-9, 39-45, bibl. 5.
The common diseases and their control.

f Remski, M. F.
Cytological investigations in *Mammillaria* and some associated genera.
Bot. Gaz., 1954, **116:** 163-71, bibl. 22, illus.
142 members of the Cactaceae.

g Rivas Goday, S., and Fernández-Galiano, E.
Adenocarpus hispanicus (Lamk.) DC. como planta ornamental. (***Adenocarpus hispanicus* as an ornamental.**)
An. Jard. bot. Madrid, 1953 (issued 1954), **2:** 305-11, bibl. 4, illus.
Habitat in Spain is the central mountain range at 600-2,000 m.

h Robertson, B. M.
Daffodil breeding in South Carolina.
Nat. hort. Mag., 1955, **34:** 93-8, illus.
Technique and most successful crosses.

i Schmadlak, J.
Rosa moschata—ihre Bedeutung für die Züchtung der Gegenwart. (***Rosa moschata* —its significance in present-day breeding.**)
Dtsch. Gartenb., 1955, **2:** 191-4, bibl. 2, illus.

j Schread, J. C., and Turner, N.
Ants as pests.
Circ. Conn. agric. Exp. Stat. **188,** 1954, pp. 4, illus.
Chlordane recommended for control in gardens and lawns.

k Smith, K. M.
Some recent work on plant viruses.
Sci. Hort., 1952-54, **11:** 98-103, illus.
On tulips, anemones and other flowers.

l Stacey, G. W.
Bees and *Tilia petiolaris.*
J. roy. hort. Soc., 1955, **80:** 328-9.
Evidence that this lime is not lethal to honey bees (as suggested by W. J. Bean).

m Stephan, O.
Fortschritte auf dem Gebiete der Rosenzucht. (**Developments in the field of rose breeding.**
Dtsch. Gartenb., 1955, **2:** 196-7, illus.
Descriptions of new rose varieties.

n Wade, G. C.
Rose diseases in Tasmania.
Tasm. J. Agric., 1955, **26:** 135-41, illus.
Symptoms and control.

o Wróblewski, A., Korczyńska, E., and Wilusz, Z.
Szkody mrozowe w arboretum Kórnickim w czasie zimy 1939/40. (**Frost damage in Kornik arboretum in 1939/40.**) [English and Russian summaries ⅓ p. each.]
Prace Zakł. Dendrol. Pomol. Kórniku, 1952, pp. 126-48, bibl. 15 [received 1955].
Behaviour of many woody ornamentals indicated.

p Ziegenbalg, C.
Die Verwendung von Arznei- und Gewürzpflanzen zu Zierzwecken. (**The use of medicinal and spice plants for ornamental purposes.**)
Dtsch. Gartenb., 1955, **2:** 152-4, illus.
Tabulated suggestions cover many species.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Avocadoes.

(*See also* 4282, 4292.)

4270. Raabe, R. D., and Zentmyer, G. A.
Susceptibility of avocados to *Dematophora* root rot.
Plant Dis. Reptr., 1955, **39:** 509-10, bibl. 2, illus.
Avocados and *Dematophora* root rot.
Calif. Citrogr., 1955, **40:** 475, bibl. 2.

Both Mexican and Guatemalan rootstocks have proved extremely susceptible when inoculated with *Dematophora* (*Rosellinia*) *necatrix*. Because of this, land known to be infected should be avoided when planning new avocado orchards.—Calif. Citrus Exp. Stat., Riverside.

4271. Hall, A. P., Moore, J. G., and Morgan, A. F.
B vitamin content of California-grown avocados.
J. agric. Food Chem., 1955, **3:** 250-2, bibl. 17.

Studies were made on the vitamin B, fat and water contents of Fuerte, Anaheim and Hass avocado fruits. No consistent effect on these constituents was found to result from the season, crop year, period in refrigeration, or period of ripening at room temperature. The greatest variable was the fat content, which was 17-20% in the Fuerte and Hass varieties but only 10-12% in Anaheim. Anaheim also had the lowest values for thiamine, folic acid, vitamin B_6 and biotin. Hass contained lower thiamine but higher niacin, folic acid and pantothenic acid than Fuerte.

Citrus—general.

(*See also* 4340g, i, l, 4341, 4462, 4478.)

4272. van Niekerk, O. T.
Report on activities of the S.A. Co-operative Citrus Exchange Field Department, May, 1955.
Citrus Gr, 1955, No. 257, pp. 7-9, 12.

Diseases. Black spot: on lemons 2,4-D, Flit 406 and 50% bound copper gave poor control, but on Valencias bound copper was satisfactory. Waste in transit: treatment with Dowicide A–2,4-D mixture effectively controlled decay in fruit which was not stung by fruit flies or piercing moths; sooty blotch blemishes did not spread on fruit kept for 4 weeks in a cooling store but discoloration increased in intensity. *Pests.* Ants: dieldrex (1:11) gave better control than chlordesol 50 (1:25). Soft brown scale: 20% chlorthion at 7 lb. per 100 gal. gave as good control as 1% oil spray; malathion at 6[illegible] lb. per 100 gal., and malathion at 5 lb.+parathion at 5 lb. per 100 gal. were effective provided ants were controlled. Oil sprays in spring: low oil concentrations (0·4%) did not materially affect yield or quality but higher concentrations slightly depressed yield and adversely affected juice percentage and T.S.S. Bud mite: no differences in fruit abnormalities resulted from sprays of parathion, oil and lime sulphur applied at various times. Ring blotch: this was found to be caused by grey mite; observations indicate that lime sulphur may give effective control. Red scale: best control, not resulting in soft scale build up, was given by 15% thiosphos at 2½ lb. per 100 gal.+1% oil in October or January. *Nutritional problems.* In the East Cape Midlands soil applications of chelated iron had no effect on lime induced chlorosis but in the Sundays River Valley responses were obtained in young grapefruit orchards with chelated iron oil applications. Arsenical sprays: effects studied. Fertilizers: copper increased yield and improved appearance and size of fruit in an old Valencia orchard, and significantly reduced Navel splitting. In trials with Kraal manure and NPK fertilizers K significantly reduced the number of fruits affected by creasing. *Maturity tests.* 6 juice extraction and 9 juice straining methods were compared. *Packaging.* Various methods tested.

Citrus—varieties, rootstocks and propagation.

(*See also* 4138, 4340h.)

4273. Marloth, R. H., and Basson, W. J.
Midseason orange varieties. Their role in South Africa's production.
Fmg S. Afr., 1955, **30:** 291-6.

Trials of midseason orange varieties were carried out to determine which were most suited to South African conditions and which would best fill the period of short supply between the Navel and Valencia harvests. Results obtained at Alkmaar on rough lemon and sweet orange rootstocks are summarized. The midseason varieties recommended for commercial planting in the Union, and particularly in the Eastern and Northern Transvaal, are Hamlin, Premier, Tomango, Clanor and Pineapple.

4274. Richards, A. V.
A new citrus rootstock.
Trop. Agriculturist, 1954, **110:** 292.

The semi-wild *Heen naran* (*Citrus crenatifolia* var. *lycopersiciformis* Lush.) which was used for the first time in the citrus stock-scion trials at the Horticultural Nursery, Peradeniya, has shown great promise as a compatible rootstock for the seedless Bibile sweet orange and the Nagpur Santra mandarin. It comes true to type from seed, which is highly polyembryonic, and makes erect vigorous growth like the rough lemon. It shows appreciable resistance to both citrus canker and scab which are common in Ceylon. Bud take amounts to over 95% and the scions make vigorous, healthy growth.

4275. Norman, G. G.
Citrus budwood certification program.
Citrus Mag., 1955, **17** (10): 14-17, 36-7.

The Florida Budwood Program is aimed at selecting budwood parent trees which are vigorous, true to type and free from bud-transmitted virus diseases. Buds taken from each prospective parent are grown on indicator plants. Trees with an abnormal amount of bud variation are eliminated. So far, 514 candidate trees remain out of 834 applications.

4276. Reid, R. D.
Nursery method speeds growing time.
Calif. Citrogr., 1955, **40:** 318-19.

By raising citrus seedlings in a glasshouse with both top and bottom heat the time taken to produce budded trees ready for planting out has been reduced to about 2 years, compared with the 3 or 4 years needed to produce trees from seedlings raised initially in an open lath-house. The procedure adopted, which involves planting seed in seed boxes and pricking out into 1¾ in.×1¾ in.×8 in. paper pots, is outlined.—Limoneira Co., Santa Paula, Calif.

Citrus—soils, tree composition and nutrition.

(*See also* 4340j.)

4277. Chapman, H. D., and Harding, R. B.
What is happening to our citrus soils?
Bett. Crops, 1955, **39** (5): 11-14, 40-4, bibl. 23, illus.

An evaluation is made of the chemical, physical and biological characteristics of California citrus soils, which during years of cultivation have undergone some profound changes, with a view to developing soil management practices favourable for the maintenance of soil productivity.

4278. Monnier, G.
Les terrasses à lit en pente pour l'interception et l'évacuation des eaux. **(Bench terraces on slopes for collecting and removing water.)**
Fruits d'Outre Mer, 1955, **10:** 278-83, illus.

The heavy rains in fruit growing areas in French Guinea necessitate the use of channels to collect the water and reduce its run-off speed. Calculations and practical data needed for constructing contour channels in citrus plantations are discussed and illustrated.—I.F.A.C., Foulaya.

4279. Aldrich, D. G., Buchanan, J. R., and Bradford, G. R.
Effect of soil acidification on vegetative growth and leaf composition of lemon trees in pot cultures.
Soil Sci., 1955, **79:** 427-39, bibl. 22, illus.

A comprehensive study involving four old citrus soils and four corresponding non-citrus soils from four localities in southern California has been conducted with lemon trees grown in pot cultures in the greenhouse in an effort to determine the value of soil acidification as a management practice for alkaline soils. Appropriate additions of sulfur to the eight soils produced levels of reaction ranging in approximately unit decrements from above pH 8·0 to slightly less than pH 4·0. Results of these treatments indicate that acidification produced significant differences in lemon tree growth and that there is a positive, significant correlation between growth and pH for each soil studied. As the soils became more acid with treatment, growth decreased. Growth data also reveal that at any particular pH level lemon trees generally grow larger in non-citrus soil than in corresponding old citrus soil. Detailed chemical analyses of the macroelement and microelement composition of leaves from trees growing in the various treatments suggest that increasing sulfur toxicity at lower pH levels is a primary factor in the growth reduction observed in these soils. In two of the soils, growth undoubtedly was also restricted by the absorption of toxic quantities of boron and lithium solubilized by the acidification treatments. Determinations of the chemical composition of the saturation extracts and of exchangeable bases were made for each treatment and provide useful supporting information for interpreting the results of foliar analysis. Conductivity measurements on the saturation extracts suggest that salinity may also contribute to reduced growth in the more acid treatments. Obviously, from the data produced in this study, soil acidification is of questionable value as a general management practice for growing citrus trees on neutral and alkaline soils. [Authors' summary].—Calif. Citrus Exp. Stat., Riverside.

4280. Wander, I. W.
Sources contributing to subsoil acidity in Florida citrus groves.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 105-10, bibl. 14.

Data obtained from field experiments show that both sulfur and nitrogen sources influence subsoil acidity in the poorly buffered sandy soil types on which most citrus is grown. Determination of the soil reaction at 6-inch levels to a depth of 6 ft. in a Lakeland fine sand revealed a definite depression in pH at all levels examined due to S added as sprays. However, in areas where S sprays were not used, the soil reaction at depths below 12 to 18 inches was lower than comparable depths in virgin areas, thus indicating some other factor or factors operating to depress subsoil reaction. Examination of the soil reaction to a depth of 6 ft. in field plots which had received nitrate or ammonium N sources for a period of 12 years indicated a definite subsoil acidifying effect from the ammoniacal source. This lowering of subsoil reaction persisted even though the topsoil reaction was maintained at 5·6 to 5·8 with ground limestone. It is believed that the acidity resulting from the direct adsorption of ammonia by citrus roots in the subsoil cannot be efficiently corrected by additions of calcium and magnesium carbonate to the topsoil. [Author's conclusion].—Fla Citrus Exp. Stat., Lake Alfred.

4281. Rosselet, F.
Bio-assay of P, K and Mg in citrus fertilizer plots using *Aspergillus niger*.
S. Afr. J. Sci., 1955, **51:** 331-5, bibl. 7.

Bio-assays of K, P and Mg using *Aspergillus niger* as a test organism, were carried out at Nelspruit on citrus orchard plots, which had received different fertilizer treatments, and on an adjoining soil taken to represent the original soil. By correlating yield data with bio-assays, adequate and deficiency levels for K and P were determined. The original soil had adequate K, but later K-deficiency became a limiting factor. P was deficient in the original soil. The application of kraal manure added more K to the soil than did the K fertilizer. The K applied in the balanced fertilizer was sufficient for good yields but did not maintain the original K status of the soil. The P fertilizer increased the P status to well above the adequate level and to a greater extent than kraal manure applications. A highly significant positive correlation was found between soil K and leaf K; the correlation between soil K and leaf Mg was strongly negative.

4282. Jones, W. W., Embleton, T. W., and Johnston, J. C.
Leaf analyses as a guide to fertilizer need for oranges, lemons and avocados.
Citrus Leaves, 1955, 35 (6): 6-7, bibl. 2.
Leaf analyses as a guide to fertilizer need.
Calif. Citrogr., 1955, **40:** 332, 346-7, bibl. 2.

It is suggested that for oranges leaf analyses should be based on fully expanded, spring-flush leaves from non-fruiting terminals and for lemons and avocadoes on the youngest fully expanded leaf from non-fruiting branches which are not growing. In interpreting the results of leaf analyses allowance must be made for trends in N, P and K due to season and leaf age. The seasonal trends in the minimum adequate levels of these elements in oranges and lemons are shown graphically, and deficiency and excess levels of the commoner minor elements are tabulated. Similar standards are now being worked out for the avocado.

4283. Heymann-Herschberg, L.
Nitrogen and phosphorus content of citrus leaves in Israel: frequency distribution, and influential factors.
Ktavim (English Ed.), 1954, **5:** 19-27, bibl. 23.

Results of analyses of N and P in citrus leaves made in unselected groves during 7 years are summed in frequency curves: data obtained from 550 Shamouti orange trees indicate that in 75% of the examined groves N-supply was low or deficient, with maximum frequency occurring at 2·03% of N in leaves, while P-content was relatively high, with maximum frequency occurring at 0·11-0·12%. Leaf analyses undertaken in carefully selected groves during two seasons, 1948-1950, show that: 1. Leaves from trees on soils with medium silt and clay content have higher N-percentages than those on sandy or heavy clay soils. 2. Leaves of Eureka lemon and Shamouti orange trees budded on sour orange had significantly lower N contents than did those budded on rough lemon or sweet lime; P-percentages in Shamouti orange leaves were highest on sour orange, while those in Eureka lemon were lowest on this stock. Variations may tentatively be ascribed to differences in scion-stock compatibility. 3. Marsh Seedless grapefruit and Eureka lemon leaves contained less N and P than did Valencia orange and Clementine mandarin leaves. It was concluded that while both N and P content in citrus leaves are greatly affected by N-fertilizing, they are also dependent on soil-type, rootstock and species. [From author's summary].—Agric. Res. Stat., Rehovot.

4284. OPPENHEIMER, H. R., and HEYMANN-HERSCHBERG, L.
Effects of nitrogen fertilizing on soil, growth, leaf composition, and yield in Shamouti orange groves.
Ktavim (English Ed.), 1954, **5**: 5-17, bibl. 37.

An extended trial was carried out to test the effects of three levels of ammonium sulphate fertilizing on Shamouti [Jaffa] orange trees. Fourteen-year-old trees, planted on a sandy soil in the coastal plain of Israel received 11, 22 or 33 kg. of N per dunam [1 dunam = ¼ acre] annually for six years. Trees fertilized with 11 kg. of N per dunam produced large crops averaging 5·5 tons per dunam. Larger N applications did not increase yields and caused deterioration of fruit quality. Abundant N fertilizing was associated with thick rind, a high percentage of soluble solids and acid in the juice, a low T.S.S.-acid ratio and, possibly, a slight decrease of vitamin C content of juice. Fruit size was not affected. Nitrogen tended to promote the vegetative growth of trees. The ammonium sulphate applications were reflected by an increase in soil nitrates, a decrease in available soil phosphorus and marked acidification of the soil. Leaf analyses indicated that the nitrogen reserves of trees gradually increased during the experimental period and that, at the lowest fertilizer application, trees were well supplied with N; larger applications induced "luxury consumption" of N. [From authors' summary].—Agric. Res. Stat., Rehovot.

4285. WALLACE, A., AND OTHERS.
Translocation of nitrogen in citrus trees.
Proc. Amer. Soc. hort. Sci., 1954, **64**: 87-104, bibl. 27.

A relatively large amount of the nitrogen in citrus leaves was water soluble and the soluble portion remained relatively constant for leaves of different ages. There was a tendency for N in old leaves to be translocated to new growth, especially under conditions of N deficiency. Amides and ammonia N portions of the soluble N were higher and the free amino acids were lower in leaves about to absciss than in leaves not ready to absciss. In rooted cuttings translocation of N to new root and shoot growth amounted to as much as 25% from the original leaves and 30% from the original stem. There was from 25 to 30% loss of N in orange leaves during new growth flushes of mature trees and most of this N was not renewed in the leaves. There was 29% less N and 52% less K in 17-month-old Valencia orange leaves on fruit-bearing twigs than on non-fruit-bearing twigs. A case was cited where clonal lemon material had green leaves in one instance and yellow N-deficient leaves in another when both had identically the same N content. In field trees, leaves abscissing at 9 and 10 months of age returned essentially no N to the tree before abscission. As leaves became older before abscissing, as much as 56% of the N, 59% of the P, and 35% of the K returned to the tree before leaf fall. Size and N content of flowers decreased as the season advanced. Between 4 and 7 days after application of N^{15}-labelled N to a 3-year-old field tree, N^{15} appeared in the leaves of the tree in amounts sufficient for measurement. The labelled N tended to accumulate in young leaves and fruit. Ringing or cutting the phloem had little effect in disturbing the upward movement of N from the soil when ammonium N was applied in a glasshouse experiment with 2-year-old cuttings. Cutting the xylem completely stopped the upward N movement. Labelled N moved both upward and downward from old to new growth in grafted seedlings, but with great facility upward. Possible temperature effects on N translocation are discussed. [From authors' summary].—Univ. Calif., Los Angeles.

4286. PRALORAN, J.-C.
Note préliminaire sur les besoins saisonniers en azote des orangers d'après la teneur des feuilles en cet élément. **(A preliminary note on the seasonal nitrogen requirements of orange trees based on the leaf content of this element.)**
Fruits et Prim., 1955, **25**: 192-4, bibl. 2.

Mature Washington Navel orange trees received from 0·5 to 2·0 kg. ammonium sulphate per tree in a trial at Sidi Slimane. Leaf analysis led to the conclusion that (1) N should be applied thrice during the season, namely in January/February to assist the spring flush and flowering, immediately after the June drop to supply requirements for fruit development, and in August/September to provide for autumn growth; and (2) that ammonium sulphate has an immediate action. The experiment also showed that a balanced fertilizer for oranges consists of 1·0 kg. N, 0·25 kg. P_2O_5 and 0·3 kg. K_2O per tree.

4287. HAAS, A. R. C., AND BRUSCA, J. N.
In lemon cultures—nitrate amd potassium levels.
Calif. Citrogr., 1955, **40**: 320-1.

The results of 3 trials are briefly summarized. (1) Eureka lemon trees on sour orange rootstocks growing in soil cultures received nutrients in which nitrate nitrogen was varied from 25 to 600 p.p.m. All the trees remained healthy, but as N was increased total fresh weight, and dry matter, total ash, water-soluble ash and water-soluble Ca in the leaves increased and K and P in the leaves declined. Fruit yields tended to increase, and fruit size to decrease, with increasing supplies of N. (2) Keen Lisbon lemon trees on Seville bittersweet stocks growing in sand culture received nutrient solutions containing from 50 to 700 p.p.m. K. Maximum fruit yields occurred in the range of 500 to 600 p.p.m. K but without an accompanying decline in fruit size. With high K mature healthy leaves were similar in composition to immature leaves, containing high K and low Ca, which suggests that the processes involved in leaf senescence were retarded. Peel K and pulp K also increased with increasing supplies of K. (3) Potassium nitrate and calcium nitrate were compared as sources of nitrate N for lemon trees on sour orange grown in soil cultures. Fruit size increased as the concentration of K in the nutrient solution was increased. K in the fruit peel and K and Ca in the flowers were also markedly affected.

4288. Kuykendall, J. R., and Wallace, A.
Absorption and hydrolysis of urea by detached citrus leaves immersed in urea solutions.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 117-27, bibl. 30.

Detached leaves of several species of citrus when immersed in urea solutions were observed to absorb relatively large amounts of urea. A temperature effect on absorption was measured as a Q_{10} of 1·28. Doubling the urea concentration of a bath solution essentially doubled the rate of urea absorption by detached leaves. There appeared to be species and age-of-leaf differences in the rate of absorption of urea by leaves; Valencia orange leaves absorbed urea faster than Eureka lemon leaves, and young leaves absorbed urea much faster than mature leaves. Data are presented indicating the occurrence of urease in leaves and in leaf extracts. Time-course studies were made of the activity. There were variety and species and age-of-leaf differences in the activity of urease. The extractable urease activity of young leaf tissue was at least twice that of mature leaf tissue. The amount of urease activity in intact leaves was similar to that in leaf extracts. Half or more of the absorbed urea was hydrolyzed within 24 hours by intact but detached leaves. Sufficient urease activity was present to indicate that urea hydrolysis should never be a limiting factor in the assimilation of foliar applied urea. Sucrose had no effect on the ability of a purified urease suspension to hydrolyze urea. [Author's summary].—Univ. Calif., Los Angeles.

4289. Cassidy, P. H.
Increasing Valencia orange sizes with urea and 2, 4-D sprays.
Citrus Leaves, 1955, **35** (5): 6-7, illus.

Experience in well-farmed groves has shown that a spray application of urea+2, 4-D made in late May or early June within 4 to 10 weeks of blossoming will increase the size of Valencia oranges. Recommended rates are 5 lb. urea per 100 gal. and 12 to 24 p.p.m. 2,4-D depending on the age of the fruitlets. An average mature tree needs about 6 gal. of spray. The spray mixture should not be combined with other sprays containing oil or paraffin, but Zn and Mn may be added.

4290. Russo, F., and Raciti, G.
Sintomi di carenza di manganese negli agrumi. Metodo di cura. **(The symptoms and control of manganese deficiency in citrus.)**
[English summary ½ p.]
Ann. Sper. agrar., 1955, **9:** 871-81, bibl. 26.

Manganese deficiency in citrus has been observed in various parts of Sicily. The symptoms are described. Recent experiments on lemon, clementine and orange at Acireale Experimental Station show that, where Mn and Zn deficiency occur together, they can be controlled by copious foliage spraying with 600 g. zinc sulphate, 300 g. manganese sulphate and 450 g. sodium carbonate or slaked lime in 100 l. water plus a sticker, and that Mn deficiency alone can be controlled with 300 g. manganese sulphate and 150 g. sodium carbonate in 100 l. water plus a sticker. The best time for treatment is during the spring growth flush.

4291. Turrell, F. M., and Weber, J. R.
Elemental sulfur dust, a nutrient for lemon leaves.
Science, 1955, **122:** 119-20, bibl. 9, illus.

It has been observed in California that citrus trees dusted with elemental sulphur have produced more first-grade fruit than undusted trees. Studies were undertaken to determine the ways in which elemental sulphur might benefit the trees other than by its insecticidal or fungicidal action. It was found that both the acid-soluble and the alkali-soluble proteins of Eureka lemon leaves dusted with S^{35}-labelled elemental sulphur became radioactive. The sulphur not only penetrated the leaf but also entered the metabolic stream and was synthesized into protein. Sulphur applied only to leaves on one half of a Y branch was transported to leaves on the other, non-dusted half, probably in the form of inorganic SO_4; in this form it would be available for nutrition of the tree.—Calif. Citrus Exp. Stat., Riverside.

4292. Brusca, J. N., and Haas, A. R. C.
Zinc effect in citrus and avocado.
Calif. Citrogr., 1955, **40:** 384-5, illus.

Zinc sulphate at various concentrations up to 15 p.p.m. Zn, supplied in nutrient solutions to lemon and avocado plants growing in sand or soil culture, not only corrected leaf mottling but increased leaf size and the intensity of green colour and markedly stimulated growth.

4293. Savvides, K. L.
"Mottle leaf" of citrus.
Countryman, Nicosia, 1955, **9** (5): 25-6, bibl. 2.

Trials at Famagusta and elsewhere in Cyprus showed that mottle leaf is due to zinc deficiency. The symptoms, which are described, disappear after the application of 0·5% zinc sulphate sprays, neutralized by 0·25% lime, in March, April or May.

Citrus—climate, irrigation and air pollution.

4294. Caprio, J. M.
The regreening of Valencia oranges in southern California in relation to mean monthly temperatures.
Citrus Leaves, 1955, **35** (5): 10, 32, bibl. 4.
Regreening of Valencia oranges.
Calif. Citrogr., 1955, **40:** 287-8, bibl. 4.

In southern California Valencia oranges normally bloom in April. The fruits develop their fullest orange colour late in the following winter, which is many months before they are ready for market, and in some years during the spring an appreciable proportion turn green again. The prevalence of regreening was examined in relation to weather data for the period 1926 to 1953. The analysis suggests that temperatures affect fruit colour during two main periods, namely from the February preceding blossoming to September, inclusive, and from November to the following August. Good colour, with little or no regreening, appears to be favoured by above-average temperatures in the first period, especially during the spring, and by below-average temperatures in the second period, especially in the late winter and early spring. Relatively high temperatures at the beginning of the first period result in early blooming and this, together with a warm growing season, tends to advance maturity. This suggests that crops which are relatively mature on entering the winter period are unlikely to regreen. Further studies will be necessary, however, to determine the exact relations between weather factors and fruit colour.

4295. BASSON, W. J.
The water requirements and irrigation of citrus trees.
Fmg S. Afr., 1955, **30:** 263-6, 272, bibl. 10, illus.

Some American and South African literature on the water requirements of citrus is examined. Data show that mature trees need 35-45 morgen* inches per year for normal growth and bearing. A brief account is given of the main irrigation systems recommended for South African conditions, namely the use of full basins, half-basins plus furrows, and sprinkler irrigation.

4296. MIDDLETON, J. T.
Air pollution effect on citrus.
Calif. Citrogr., 1955, **40:** 330, 352-3.

Work in progress and planned by members of the University of California Citrus Experiment Station on the effects of various air pollutants on citrus trees and fruits is outlined. In addition to naturally-occurring smog, specific pollutants being studied are ozone with and without hexene, fluorides and SO_2. The possible effect of pollutants in aggravating injury from copper sprays is also being investigated. Injuries obtained in glasshouse fumigation trials with ozone, ozonated hexene and SO_2 are described; they tended to be most severe at high temperatures.

Citrus—flowering, fruiting and pollination.

(*See also* 3421, 4340d, k.)

4297. MAĬSURADZE, N. I.
Flowering and fruiting of grapefruit and pomelo. [Russian.]
Agrobiologija, 1954, No. 6, pp. 121-6, bibl. 1, illus.

Bud initiation and differentiation in grapefruit and pomelo occur in early April and coincide with the beginning of spring growth. Flowering occurs from the end of April till early June. An illustrated description is given of 4 types of flowering shoots observed. The most productive type is vigorous with normal internodes, normally developed leaves from the axils of which single flowers emerge, and a tendency to make secondary growth. A second type has shorter, flower-bearing internodes; its leaves are sometimes reduced to scales and it produces a medium crop. A third type has very short internodes and scales instead of leaves, it can develop from latent buds on old wood and occurs on damaged or otherwise weakened trees; its flowers or newly set fruits usually drop. A fourth type, which is vigorous with an abundance of leaves but only a single apical flower, is characteristic of certain varieties. Autumn flowering of grapefruit and pomelo is of little importance. With the exception of the hybrid form Azahikan, the grapefruit and pomelo are self-fertile. Mention is also made of a Duncan seedling which flowered and set fruit when only a few months old.

4298. ANON.
La mise à fruit du clémentinier par incision annulaire. **(Inducing bearing in clementines by ringing.)**
Feuille d'Inf. vitic. arbor. Tunis.,* reprinted in *Fruits et Prim.*, 1955, **25:** 18-19.

Experiments begun in 1948 have shown that double-ringing (1) can take place 6 years running without any ill effects, (2) gives yield increases ranging from 1¼ to 30 times, (3) is not the direct cause of the reduction in fruit size which occurs (this being due to the increased yield), (4) increases earliness, and (5) reduces pip number from 5-25 to 1-2. Ringing should be done on the framework branches rather than the trunk and no bark should be removed, the operation consisting simply of a clean cut right into the sapwood. The first ring should be cut between full bloom and petal-fall and the second 3 weeks later 5 cm. below the first. [See also *H.A.*, 22: 2956 and 24: 4208-4210].—Serv. Hort., Maroc.

4299. VAN HORN, C. W., AND TODD, F. E.
Bees, bouquets and better tangerines.
Progr. Agric. Ariz., 1954, **6** (1): 11, from abstr. in *Bee World*, 1955, **36:** 100.

Clementine tangerine trees were caged (1) excluding bees, (2) with a colony of honeybees, (3) with bees plus bouquets of Hamlin orange blossoms (later with Meyer lemon blossoms); group (4) trees were not caged but left to chance pollination. Treatment No. 3 gave 16 times as much fruit as No. 1, twice as much as No. 2 and 13% more than No. 4; it also produced better quality fruit. The cross-pollinated fruit had more seed, was juicier and sweeter. Providing one colony per acre and interplanting or grafting suitable pollen parents are recommended.

Citrus—diseases and pests.

(*See also* 3856, 3875, 3885, 4340b, c, f, m.)

4300. FOOTE, F. J.
Citrus soil fumigation.
Calif. Citrogr., 1955, **40:** 256, 264, 266-7, bibl. 1.

Earlier investigations by the Limoneira Company, Santa Paula, California, indicated the desirability of fumigating old citrus soils before replanting citrus [*H.A.*, 22: 4267]. Further experience with DD fumigation is here reported. In addition to promoting increased growth and cropping in Valencia oranges and lemons fumigation has resulted in marked increases in the percentage of large-sized fruits. Preliminary experiments on the fumigation of inter-row spaces between living lemon trees have also shown promising results. The trees suffered an initial set-back, but, where fumigation was done on one side only and at a rate of 120 gal. per acre, recovery was fairly rapid and both growth and yields were enhanced within 3 years. A heavier rate of fumigation and treatment of the inter-row spaces on both sides of the trees resulted in greater set-backs and slower recoveries. Experience has also shown that fumigation may give variable, and sometimes very inefficient, results. The reasons for this are discussed and a suggested procedure for fumigation is outlined.

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* 1 morgen = 2⅛ acres.

* Being an extract from a study by the Service d'Horticulture, Maroc.

4301. Rossetti, V.
A doença do limoeiro cravo nos laranjais de São Paulo. **(A disease of Rangpur lime in São Paulo citrus plantations.)** [English summary ⅓ p.]
Biológico, 1955, **21:** 1-8, bibl. 10, illus.

The disease, believed to be of virus origin and first observed in 1947, occurs in Rangpur lime rootstocks budded with several sweet orange varieties. The symptoms, which are somewhat similar to those of psorosis, are confined to the rootstock and consist of bark splitting and scaling and gummosis. The growth of trees on diseased rootstocks is slow. Control measures include the use of healthy budwood, inarching with resistant varieties such as Cleopatra mandarin and Caipira orange, and cleaning diseased stems.

4302. Moreira, S.
A moléstia exocortis e o cavalo de limoeiro cravo. **(Exocortis and Rangpur lime rootstocks.)** [English summary 1 p.]
Rev. Agric. Piracicaba, 1955, **30:** 99-112, bibl. 10, illus.

Rootstock trials at several experimental stations of the Institute of Agronomy have provided information about the disorder affecting citrus grafted on Rangpur lime. The symptoms are similar to those of exocortis in trifoliate rootstocks. Splitting, scaling and death of the bark occur in the rootstock and vein chlorosis and out-of-season flowering in the crown. Exocortis-infected scions cause these symptoms when grafted on Rangpur lime, but scions from nucellar seedlings of infected parents do not. Psorosis does not induce these symptoms. Exocortis-infected trees can be cured by inarching with tolerant rootstocks.

4303. Bitancourt, A. A.
Estudos sôbre a "tristeza" dos citrus. III. Experiências de transmissão. **(Studies on tristeza disease of citrus. III. Transmission tests.)** [English summary 1¼ p.]
Arq. Inst. biol. S. Paulo, 1952/54, **21:** 57-64, bibl. 8, illus.

Notes on unsuccessful attempts to transmit tristeza by aphids and by budding are followed by an account of an experiment begun in 1948 on transmission by grafting. The scions used were from (a) healthy sweet orange seedlings, (b) and (c) the two crown components of a plant consisting of a sour orange rootstock and a composite crown formed partly of sweet orange showing tristeza symptoms and partly of symptomless sour orange, and (d) symptomless sweet orange on a sweet orange rootstock from an infected orchard. These scions were approach-grafted onto healthy sweet orange worked on sour orange a little above the union. Untreated controls and the grafted plants of category (a) remained healthy, whereas those of (b), (c) and (d) developed tristeza. [For Parts I and II, see *H.A.*, 19: 2420 and 22: 4258.]

4304. Thompson, W. L., Johnson, R. B., and Sites, J. W.
Greasy spot control.
Citrus Ind., 1955, **36** (6): 5-10, 14, bibl. 8.

In 1953 experiments were started to determine whether fungicidal control of greasy spot was possible, and whether the disease would develop on trees where rust mite was kept to a minimum. Greasy spot was most severe in untreated plots and in those where no sulphur had been applied after 20 June. The least amount of infection occurred in plots where a neutral copper spray was combined with a wettable sulphur spray applied on 7 June. In other experiments oil sprays show promise for control, although rust mites were not an important factor in causing greasy spot. More extensive trials were started in 1954 on grapefruit and oranges. A neutral copper application in July gave the most satisfactory control, and an oil emulsion (1·3% oil) was next in effectiveness. Lime-sulphur plus wettable sulphur sprays were effective when applied in July and again in August, but not when applied in June and July. Results indicated that 0·4-0·5 lb. of metallic copper was sufficient for greasy spot control. July appeared to be the critical month for spray application. Summer copper sprays accentuated corky growths on the fruit, thus lowering quality. Internal quality of Hamlin oranges was not affected by the addition of copper to the July parathion-wettable sulphur spray.—Fla Citrus Exp. Stat., Lake Alfred.

4305. Ramakrishnan, T. S.
Limb breakage in citrus.
Proc. Indian Acad. Sci. Sect. B, 1955, **41:** 247-50, bibl. 4, illus.

The wound-parasite fungus *Trametes cervina* has been found to be associated with branch breakage occurring in bearing sweet oranges and limes (*C. aurantifolia*) in the districts of North Arcot and Cuddappah. The orchards in question were also heavily infested with the borer *Arbela tetraonis*. Injecting the insect galleries with a petrol-naphthalene mixture followed by painting the crotches with 10-10-50 bordeaux mixture afforded protection, provided the treatment was carried out before the fungus had invaded the tissues.

4306. van Dinther, J. B. M., and Samson, J. A.
De bladluis *Toxoptera citricidus* als citrusplaag. **(The leaf aphid *Toxoptera citricidus* as a citrus pest.)** [English summary, ½ p.]
Surinaam. Landb., 1955, 3: 54-8, bibl. 1.

Several materials were used at various concentrations in laboratory tests and field trials against *Toxoptera citricidus*. The materials were placed in the following order of decreasing activity after laboratory tests: parathion > aldrin-oil > lindane-oil > DDT-oil = chlordane-oil > lindane > mineral oil > DDT = chlordane. Parathion, aldrin-oil, DDT-oil and mineral oil gave comparable results in field trials.

4307. Menezes Mariconi, F. A., and Iba, S.
A mosca do Mediterrâneo. **(The Mediterranean fruit fly.)**
Biológico, 1955, **21:** 17-32, bibl. 14, illus.

In experiments in 1951/53 in São Paulo, Brazil, lindane and toxaphene sprays, with or without added sugar, gave the best control of *Ceratitis capitata* on orange and guava.

4308. Jeppson, L. R.
New acaricide for citrus mites.
Calif. Agric., 1955, **9** (6): 11.

Chlorobenzilate (ethyl *p*, *p*′-dichlorobenzilate) has given promising results against *Aceria sheldoni*, *Phyllocoptruta* *oleivora* and *Brevipalpus lewisi*, but has been less effective than several other acaricides against *Metatetranychus citri*.—Univ. Calif., Riverside.

4309. YERINGTON, A. P., AND GERTLER, S. I.
Acaricidal properties of 2-cyclohexyl-4, 6-dinitrophenyl and pentachlorophenyl acetates.
J. econ. Ent., 1955, **48**: 215, bibl. 1.

Against adults of citrus red mite, *Metatetranychus citri*, and two-spotted spider mite, *Tetranychus bimaculatus*, parathion was more effective than 2-cyclohexyl-4,6-dinitrophenyl and pentachlorophenyl acetate or aramite. Against the eggs of the two-spotted spider mite 2-cyclohexyl-4,6-dinitrophenyl acetate was the most effective, but against the eggs of the citrus red mite all 4 compounds were relatively ineffective. In phytotoxicity tests on 5 species of plants 2-cyclohexyl-4.6-dinitrophenyl acetate caused no injury when used as a 1% spray, whereas pentachlorophenyl acetate caused moderate injury to beets, peas and barley, severe injury to chard and slight damage to collards.

4310. DEBACH, P., LANDI, J. H., AND WHITE, E. B.
Biological control of red scale.
Calif. Citrogr., 1955, **40**: 254, 271-2, 274-5.
Present status of biological control of the California red scale.
Citrus Leaves, 1955, **35** (7): 6-7, 33.
California red scale control.
Calif. Agric., 1955, **9** (8): 8, 10.

In the course of a review of current investigations on the use of *Aphytis* "A" and other parasites to control red scale [*Aonidiella aurantii*] reference is made to the control of the purple scale [*Lepidosaphes beckii*] on oranges by a spray programme which does not appear seriously to upset the populations of beneficial insects. In this programme oil sprays are applied to each third pair of rows at 6-month intervals, so that the whole grove is covered once in 18 months [see also note 4340m].

4311. SUGONJAEV, E. S.
An example of the combination of chemical and biological methods in the control of soft scales (Homoptera, Coccoidea) on citrus. [Russian].
Doklady Akad. Nauk S.S.S.R., 1955, **101**: 375-7, bibl. 10.

In the northern subtropical area of the U.S.S.R. (Krasnodar region) *Coccophagus lycimnia* is the most important parasite of *Coccus pseudomagnoliarum* and *C. hesperidum*. Results of control experiments showed that 1% mineral oil emulsion applied in the spring gives very good control of the scales without seriously reducing the number of the parasite pupae present at that time. Other advantages of a spring application are that the scales are young and susceptible, have not yet caused any damage and, spring growth having not yet begun, the risk of tree injury is slight. Well-timed summer spraying was also found satisfactory but resulted in some reduction in parasite populations. Among other parasites *Eucomys lecanivorum* responded to oil sprays in the same way as *C. lycimnia*, but *C. scutellaris* proved much more susceptible to summer applications.

4312. HOPKINS, L.
Biology and control of *Polistes exclamans* Viereck in Arizona citrus groves.
J. econ. Ent., 1955, **48**: 161-3.

Labourers refuse to work in citrus groves infested by the wasp *Polistes exclamans*, the stings of which are very painful. Of 12 materials tested, 1% thanite in deodorized kerosene spray base oil was the most effective and least expensive. In the autumn of 1953 a large amount of this formulation was used very successfully by growers with no injury to the citrus trees.—Ariz. agric. Exp. Stat., Mesa.

Citrus—handling, fruit composition and storage.

(*See also* 4340e.)

4313. GUNN, J. T.
Bulk handling California citrus fruits.
Calif. Citrogr., 1955, **40**: 362, 379-80, illus.

Improvements in methods of controlling moulds has made a re-examination of bulk handling between picking bag and packing house feasible. The author describes systems involving the use of large containers in place of field boxes and systems in which no containers are used, and discusses equipment and the relatively slight amount of fruit injury encountered. He concludes that Valencia oranges and lemons can be handled in bulk with less injury than in standard field boxes and that bulk handling will effect a saving equivalent to at least 5 cents per field box.

4314. HU, C.-C.
Morphological characteristics of citrus peel.
[English, with Chinese summary 1 p.]
Mem. Coll. Agric. nat. Taiwan Univ., 1954, **3** (4): 21-32, bibl. 11, illus.

Characters studied in 6 citrus species and in kumquats at the Citrus Experiment Station, Riverside, California, were oil gland density, size, shape and location as seen on the surface and in section, thickness of flavedo and albedo, and colour of rind surface, flavedo and albedo.

4315. PATRON, A.
Rendement en jus de quelques variétés d'oranges cultivées au Maroc et caractères chimiques de ces jus. (**Yield and chemical characteristics of the juice of certain orange varieties cultivated in Morocco.**)
Fruits et Prim., 1955, **25**: 14.

Yields, refractometric extract, and citric and ascorbic acid contents are tabulated for 6 varieties including Valencia Late, Hamlin and Portuguese blood.—Lab. Technol. I.F.A.C., Maroc.

4316. WEDDING, R. T., AND SINCLAIR, W. B.
A quantitative paper-chromatographic study of the amino acid composition of proteins and juice of the orange.
Bot. Gaz., 1954, **116**: 183-8, bibl. 12.

A quantitative paper-chromatographic analysis of the amino acids in proteins isolated from Washington Navel and Valencia orange fruit indicates that both qualitative and quantitative differences exist between the proteins from the two sources. A similar analysis of juice from these two fruits indicates that not all the amino acids found in the protein could be detected in the free form in the juice. There were also marked differences in amino acid and amide composition of the two juices, but they did not reflect the differences in the composition of the two proteins. [Authors' summary].—Citrus Exp. Stat., Riverside, Calif.

4317. Tindale, G. B., and Peggie, I. D.
Storage behaviour of Washington Navel oranges.
J. Dep. Agric. Vict., 1955, **53**: 317-25, illus.

The maximum storage life of Navel oranges, judged on flavour, was 3 months when picked in late June, 2½ months when picked in late July, and 2 months when picked in late August. The types of disorder which developed during storage were browning, gooseflesh, yellowing and skin breakdown. The incidence of these disorders was greatest in early-picked fruit and at a storage temperature of 35°F., and they appeared within 6 weeks. Few disorders occurred at 40°F. With a storage period of 1 or 2 months, mould wastage was least at 35°F. and greatest at 45°F. After storage for 3 months at 35°F. there was a sudden increase in mould wastage. Both borax dips and diphenyl wraps greatly reduced mould wastage, particularly in early-picked fruit. The commercial life (time for development of 10% wastage) of late-picked, untreated fruit was less than 1 month. The flavour of untreated fruit stored at 32°F. rapidly deteriorated and was only fair after 4 weeks. Mould wastage after 8 weeks at 32°F. was negligible. On transference to 45°F. after more than 2 weeks at 32°F., the fruits were quickly attacked by *Penicillium*.—Dep. Agric., Melbourne.

4318. Harding, P. L., and others.
Influence of chemical treatments and polyethylene bags on keeping quality of Florida grapefruit.
Citrus Mag., 1955, **17** (10): 31-4.

Tests showed that grapefruit could be stored successfully at 32°F. for 4 weeks. There was some reduction of decay after pre-storage treatments with Dowicide A-hexamine and with 2-aminopyridinepyrrolidine, but control was not sufficient to increase storage life. Treatments with borax made the fruit more susceptible to storage pitting and decay. Spoilage was due mainly to penicillium rots, though stem-end rot and watery breakdown occurred, particularly in lots held for 8 weeks at 32°F. plus 7 days at 70°F. The keeping quality of Florida grapefruit stored at 32°F. in polyethylene bags and lined boxes was studied. Some treatments showed promise for short storage periods, but after 9 weeks at 32°F. high percentages of decay developed. Fruit stored in polyethylene bags usually became soft, and off-flavours developed when the seals of the bags were not broken when the fruit was removed from cold storage.

4319. Rougieux, —.
Sur l'éventualité de traitement du penicillium parasite des agrumes par un antibiotique. **(On the possibility of controlling the penicillium parasitic on citrus with an antibiotic.)**
Fruits et Prim., 1955, **25**: 13.

Tests at the Algerian Agricultural Institute suggest that terramycin may prove effective against *Penicillium italicum*.

4320. Sinclair, W. B., and Lindgren, D. L.
Vapor-heat sterilization of California citrus and avocado fruits against fruit-fly insects.
J. econ. Ent., 1955, **48**: 133-8, bibl. 2.
Vapor-heat against fruit fly.
Calif. Agric., 1955, **9** (6): 3-4.
Vapor-heat sterilization of citrus, avocado fruit.
Calif. Citrogr., 1955, **40**: 359-60.

Citrus and avocado fruits were treated with moist heat by 2 methods: (1) a vapour heat "quick run-up" method to 120°F.; and (2) a vapour heat treatment which required from 4 to 8 hours to get the fruit up to 110°F. The avocadoes tested (Fuerte and Dickinson) could not tolerate either treatment. The citrus fruits were also affected, the severity of injury depending on species or variety and on fruit quality. In general, grapefruit and Valencia oranges withstood the 110°F. treatment much better than Navel oranges and lemons. To the 120°F. treatment only the Valencia oranges showed tolerance. As a result of the heat treatments, a marked reduction occurred in the titratable acidity and ascorbic acid of the fruits and this decrease in free acidity was accompanied by a corresponding increase in the pH of the juice. The soluble solids of the treated fruit had a tendency to be slightly lower than that of the control fruits. The vapour heat treatments produced off-flavours in the fruits; they were more noticeable in the Navel oranges and lemons than in grapefruit and Valencia oranges.—Calif. Citrus Exp. Stat., Riverside.

Dates.

(*See also* 4340g.)

4321. Smit, H. S., and du Preez, D.
The Henkries date grove.
Fmg S. Afr., 1955, **30**: 243-5, illus.

This date grove is situated in an area with a rainfall believed to be under 2 ins. per annum. There is plenty of subterranean water which is very brackish, occurring in some places at a depth of only one foot. Good quality dates are produced, and the grove is being extended using selected suckers and introduced seedlings. Cultural practices adopted are outlined.

4322. Monciero, A.
Notes sur le palmier-dattier. Quelques données relatives à la fumure de palmier-dattier. **(Notes on the date palm. Some information on manuring.)**
Ann. Inst. agric. Algér., 1954, **8** (4): 29-42.

In the Oued Rhir district the date palm does not respond to manuring. It obtains all its nutrient requirements from irrigation water, and gains from this source exceed losses by seepage.

4323. Monciero, A.
Notes sur le palmier-dattier. Contribution à l'étude du pollen et de la fécondation du palmier-dattier. **(Notes on the date palm. Contribution to the study of the pollen and of fertilization.)**
Ann. Inst. agric. Algér., 1954, **8** (4): 3-28, illus.

Morphology. Morphological differences in pollen grains are insufficient to permit differentiation between clones. *Selection of pollinators*. Eighteen male palms showed distinct differences in pollen yield, maturation season and inflorescence number. *Viability.* After describing the laboratory technique used in pollen germination studies the percentage germination obtained with pollen of 18 clones is given. Conclusions were: (1) shrivelled grains do not germinate; (2) very large and very small grains do not germinate so well as medium-sized grains; (3) germination rate varies widely from tree to tree, from grain to grain, and from inflorescence to inflorescence in a single tree, being lowest in early and late inflorescences; (4) young trees give poor quality pollen; (5) in certain years the pollen is immature when the inflorescences open. Sterility or lack of fertilization is demonstrated by the drop of insufficiently fertilized or unfertilized fruits immediately after the fertilizing period, by a second drop during development and by the production of seedless, parthenocarpic fruits which fail to mature. In the selection of male trees pollen viability and the production of grains of normal size are more important than high or early pollen yields. The development of a rapid test of viability by densimetric methods is being attempted. Storage is not recommended since pollen rapidly loses its viability and becomes useless after a year. *Environment.* Pollen does not mature unless the sum of daily mean temperatures from 1 January to 31 March reaches about 1200°C. Low temperatures reduce pollen quality, especially in years when high March daily means result in early flowering unfavourable to good fertilization. *Fertilization.* Receptivity ranges from 11-12 days in Deglet Nour to 5-6 in Ghars. Artificial pollination should be carried out weekly. Pollination is favoured by light winds and reduced by rain.—Stat. exp. El-Arfiane.

4324. Monciero, A.
Notes sur le palmier-dattier. La maturation artificielle des dattes Deglet Nour. **(Notes on the date palm. Artificial ripening of Deglet Nour dates.)**
Ann. Inst. agric. Algér., 1954, **8** (4): 43-8.

Dates at the third stage of maturity (half red, half orange-yellow) were successfully ripened artificially on an experimental scale and subsequently kept well. The process, which is described in detail, consists of deep freezing, oven treatment, and sulphur treatment followed by further oven treatment.—Stat. exp. El-Arfiane.

4325. Marloth, R. H.
Home curing of dates.
Fmg S. Afr., 1955, **30:** 283-4, illus.

In areas where the climate does not allow bunch ripening artificial aids to curing are used. Methods and apparatus for home-curing of mature dates are described.

Litchis.

4326. Shing, K.-C., Huang, Y.-C., and Cheng, K.
The effect of α-naphthalene acetic acid and Rootone on root formation in air-layering of litchi (*Litchi chinensis* Sonn.). [Chinese, with English summary 1½ pp.]
Mem. Coll. Agric. nat. Taiwan Univ., 1954, **3** (4): 44-56, bibl. 10, illus.

Shoots on two litchi trees, one vigorous and the other rather weak, were ringed and marcotted, using 40, 200 or 1000 p.p.m. α-NAA in lanolin, or equal parts of Rootone and water or no hormone. On the vigorous tree all the hormone treatments resulted in 100% rooting compared with 80% in the control shoots, but the length of individual roots was less in treated marcots than in the controls, particularly where 1000 p.p.m. NAA had been used. On the weaker tree Rootone gave 100% rooting compared with 40% in the control shoots, but the individual roots were very short; 40 p.p.m. NAA gave 75%, and 200 p.p.m. 80%, rooting, but 1000 p.p.m. gave only 40% rooting. The results suggest that it would be better to use lower concentrations of hormones for weak trees than for strong ones.

Macadamias.

(*See also* 4470.)

4327. Kinch, D. M.
Macadamia harvesting and processing.
Bienn. Rep. Hawaii agric. Exp. Stat. 1952/54, 1955, p. 19, illus.

A macadamia nut harvester utilizing vacuum pickup has been tested. It greatly reduced hand labour in orchards adapted for use of machinery between the rows. Two sizes of macadamia nut huskers have also been tested which are highly efficient in removing the heavy husks and cleaning husked nuts from the trash. It has been found that immature nuts can best be separated from mature ones by placing them in water, the former floating and being removed with the trash.

Olives.

(*See also* 4340a, 4341.)

4328. Chaux, —.
Méthodes de recherches adoptées en matière de biologie florale chez l'olivier. **(Methods used in the study of the floral biology of the olive.)**
Fruits et Prim., 1955, **25:** 202-7, illus.

An account is given of the methods used in 1952/54 in research on self-sterile olive varieties and their pollinators, with particular reference to flower counts, bagging, fruit-set counts and the determination of self-sterile and self-fertile varieties and of pollinators.—Stat. exp. Arbor. Sidi-Aïch.

4329. Scaramuzzi, F., and Cancellieri, M. B.
Contributo allo studio delle razze d'olivo coltivate in Toscana. Indagini condotte in Provincia di Livorno e nella media valle del Cecina. Parte I. Parte II. **(Contribution to the study of the olive varieties grown in Tuscany. Investigations made in the province of Leghorn and the middle Cecina valley. Parts I and II.)** [English summaries 4 and 5 lines.]
Ann. Sper. agrar., 1955, Vol. **9,** No. 3, Suppl. pp. lxxvii-cxix, illus., and No. 4, Suppl. pp. cxix-cxlvi, illus.

Notes are given on the history, floral biology and pollination of 33 varieties; the botanical, biological and cultural characteristics, and distribution and origin of 9 important varieties; and the oil yields and technological characteristics of 15 varieties widely grown in Leghorn.

4330. Bòttari, V.
Ricerche sulla biologia fiorale delle cultivar d'olivo nella Sicilia occidentale. **(Research on the floral biology of the olive varieties of western Sicily.)** [English summary, ½ p.]
Ann. Sper. agrar., 1955, **9:** 883-99, bibl. 8, illus.

Cross pollination studies on 5 of the principal olive varieties cultivated in the Agrigento and Trapani provinces are reported.—Staz. sper. Fruttic. Agrumic., Acireale.

4331. Marinucci, M.
La decorticazione anulare e la produttività dell'olivo. **(Ring-barking and productivity in the olive.)**
Ital. agric., 1955, **92:** 250-6, illus.

The object of ring-barking is to increase yields by the gradual removal and replacement of old branches. Branches to be removed are eliminated by stages; ring-barking is first done near the periphery of the crown and proceeds gradually towards the centre of the tree until the final ring is removed at or near the point of junction with the trunk. Branches to be replaced are ring-barked a little above the point of junction, leaving a stump on which buds will arise. Where necessary, grafting can be carried out on young branches below the point of ring-barking to give suitably placed new branches.

4332. Nicolini, J. C.
Las enfermedades y plagas del olivo en la República Argentina. **(Olive diseases and pests in Argentina.)** [English and French summaries 11 and 13 lines.]
Bol. Oleic. int., 1955, **5** (25): 29-32, bibl. 3.

Brief notes are given on bacterial, fungal and virus diseases and insect pests. Varieties resistant to leaf spot (*Cycloconium oleaginum*) are named.

4333. Foschi, S.
Gloeosporium olivae (Petri) n. comb., agente di antracnosi su rami, foglie e frutto d'olivo. **(*Gloeosporium olivae* n. comb., the agent of anthracnose on the branches, leaves and fruits of the olive.)** [English summary ½ p.]
Ann. Sper. agrar., 1955, **9:** 911-26, bibl. 12, illus.

Control of olive anthracnose—and also of leaf spot, *Cycloconium oleaginum*—can be obtained by the application of 1-2% bordeaux mixture early in May before flowering, followed, if necessary, by a 1% application in the latter half of October. Dead and diseased branches should be pruned off in the spring and diseased fruit should be removed and buried. Fruit should be picked as early as possible and processed without delay.—Lab. sper. Pat. veg., Bologna.

4334. Avidov, Z., Morer, I., and Harpaz, I.
Experiments on the control of olive fly, 1954. [Hebrew].
Hassadeh, 1955, **35:** 580-82.

Satisfactory control of olive fly on European varieties of olive was obtained by spraying with either dieldrin or methoxychlor in experiments over a period of three years in Israel. Dieldrin was consistently superior to methoxychlor and a concentration of 0·2% active material is recommended. Two applications are necessary, one in the 1st week of June and the second in the 2nd week of July. H.C.R.

4335. del Campo, E.
La lucha contra el arañuelo del olivo. **(Control of olive thrips.)**
Bol. Oleic. int., 1955, **5** (26): 17-43, bibl. 2, illus.

Following notes on the biology and distribution in Spain of *Liothrips oleae* an account is given of a large-scale experiment in 3 provinces, in which the costs of HCN fumigation, of soil spraying and of soil and tree dusting with DDT and BHC were compared. The treatments cost 8·25, 5·26, 3·86 and 4·01 pesetas per tree respectively.

4336. Graniti, A.
Un deperimento dell'olivo in Sicilia associato a due specie di nematodi. **(A decline of olives in Sicily associated with two species of nematode.)**
Olearia, 1955, **9:** 114-20, bibl. 41, illus.

A disorder of olives in Sicily, characterized by chlorosis and necrosis of the leaf tips, dieback and progressive decline, is associated with the presence on the roots of great numbers of galls caused by *Meloidogyne* sp. and especially with necrosis of the root tip caused by *Rotylenchus erythrinae*. D-D emulsion (Nematox) and parathion powder (Fostox or Carposan) both gave promising results in control experiments, when applied round the bases of the trees in May at 15 c.c. per 20 l. water plus wetter per sq. m., and 75 g. active ingredient per sq. m. respectively.—Ist. Pat. veg. Microbiol. agrar. Tec. Univ. Catania.

4337. Ramos, V. P., and others.
Détermination du parathion dans l'huile d'olive. **(Determination of parathion in olive oil.)**
Oléagineux, 1955, **10:** 509-11, bibl. 8.

Ten out of 12 samples of olive oil from trees sprayed with parathion against *Dacus oleae* showed parathion contents above the internationally fixed maximum of 3 p.p.m. The method of determination is described.—Estaç. agron. nac., Sacavém, Portugal.

Passion fruit.

(*See also* 4470.)

4338. Mariconi, F. A. M.
Contribução para o conhecimento do *Diactor bilineatus* (Fabricius, 1803), (Hemiptera-Coreidae), praga do maracujazeiro (*Passiflora* spp.) **(Contribution to the knowledge of *Diactor bilineatus*, a pest of *Passiflora* spp.)** [English summary 13 lines.]
Arq. Inst. biol. S. Paulo, 1952/54, **21:** 21-42, bibl. 27, illus.

Notes are given on the morphology, biology and control of the passion fruit bug. The concentration of Rhodiatox previously recommended [see *H.A.*, 23: 3499] proved insufficient, but 40 g. 5% Rhodiatox (parathion) per 10 l. water gave good control when applied every 2-3 weeks from the appearance of the first flower buds.

Tung.

4339. SITTON, B. G., AND OTHERS.
Trends in response of bearing tung trees to nitrogen, phosphorus, and potassium fertilizers.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 29-46, bibl. 10.

A fertilizer experiment on tung trees growing in sandy loam in Louisiana was carried out from 1943 to 1951 [for progress report see *H.A.*, 19: 1516]. The 11 years' results showed that yields were increased most promptly and to the greatest extent by applying N. P was generally ineffective in increasing yields or oil content of tung fruit. No important increases in yields resulted from applications of K prior to the 7th year, but in that and succeeding years increases from K approached those obtained from N. Oil in the whole fruit was consistently greater with high than with low K. N application at first increased oil content but later decreased it. Application of high N+high K resulted in the greatest production of oil per acre, but intermediate N+high K gave nearly as high net returns and the trees were in better condition. The use of high K resulted in a high degree of resistance to injury by early and late frosts. High N decreased resistance to injury from early frosts. but increased resistance to late spring frosts. P also decreased resistance to early frosts but had little effect on late spring frost damage. The effect of fertilizer applications on soil and leaf nutrient contents are recorded.—U.S. Dep. Agric.

Noted.

4340.

a BALGUERÍAS QUESADA, E.
Las variedades del olivo en el Término Municipal de Jaén. **(The olive varieties of the Jaén district.)**
An. Jard. bot. Madrid, 1952, **11:** 251-65, bibl. 1, illus. [received 1955].
Including a botanical description of the common variety Picual.

b DARLEY, E. F., AND WILBUR, W. D.
Studies on *Armillaria* root rot at Riverside.
Citrus Leaves, 1955, **35** (5): 7, 31.
Testing for resistance to *Armillaria* root rot.
Calif. Citrogr., 1955, **40:** 291, 306.
Studies in progress on resistance in citrus and avocadoes and on CS_2 and other fumigants.

c DEWOLFE, T. A., CALAVAN, E. C., AND SUFFICOOL, J. R.
A new damping-off disease of citrus.
Citrus Leaves, 1955, **35** (5): 16, illus.
Rough lemon and sweet orange seedlings attacked by *Pythium aphanidermatum*.

d HARDING, R. B., CHAPMAN, H. D., AND WHITING, F. L.
Size fluctuations of Valencia oranges in major California citrus districts, 1932 to 1952, indicate significance of climate as a cause of small-sized fruit.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 128-38, bibl. 26.
See *H.A.*, 24: 757.

e JONES, W. W., AND CREE, C. B.
Effect of time of harvest on yield, size and grade of Valencia oranges.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 139-45, bibl. 7.
See *H.A.*, 25: 951 and 2096p.

f KLOTZ, L. J., AND DEWOLFE, T. A.
Control of *Septoria* spotting of citrus in central California.
Citrus Leaves, 1955, **35** (6): 12-13, illus.
Control of *Septoria* spotting.
Calif. Citrogr., 1955, **40:** 396.
With zinc-copper-lime sprays followed in some cases by bordeaux mixture.

g LALUE, R.
La production des principaux fruits tropicaux et subtropicaux dans le monde. **(World production of the principal tropical and subtropical fruits.)**
Fruits d'Outre Mer, 1955, **10:** 221-4, bibl. 11, maps.
Citrus, bananas, pineapples, dates and figs for 1952/53.

h MARAMBA, F. D.
Farm management, and research and investigation in citrus orchard.
Araneta J. Agric., 1954, **2** (1): 37-48; 1955, **2** (2): 1-7.
An account of a mandarin plantation near Lipa City.

i PRUTHI, J. S., AND LAL, G.
Physico-chemical characteristics of Nagpur orange (mandarin) oil.
Bull. centr. Food tech. Res. Inst., Mysore, 1954, **3:** 301-2, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (6), *Suppl. Fruits trop. subtrop.*, No. 12-10426.

j REBOUR, H., AND RENAUD, M.
La fumure des agrumes. **(Manuring citrus.)**
Fruits et Prim., 1955, **25:** 158-61.
Recommendations for trees of different ages in Algeria.

k RENAUD, M.
La chute de juin des agrumes en relation avec la floraison. **(June drop in citrus in relation to flowering.)**
Elev. Cult. Afrique Nord, No. 72, reprinted in *Terre maroc.*, 1955, **29:** 156-61.
See *H.A.*, 24: 4207.

l RUSSO, F.
Lemon culture in Italy.
Calif. Citrogr., 1955, **40:** 255, 275-8, illus., and *Citrus Leaves*, 1955, **35** (8): 10-11, 31-2, illus.
History, distribution and varieties.

m RUTHERFORD, D. M.
Chemical-biological treatment for purple scale control.
Calif. Citrogr., 1955, **40:** 292, 301.
A popular account of the method referred to in abstract 4310.

n STERN, W. L.
Comparative anatomy of xylem and phylogeny of Lauraceae.
Trop. Woods, 1954, No. 100, pp. 1-73, bibl. 130, illus.
Including *Persea gratissima*, *Cinnamomum camphora* and *Laurus nobilis*.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 4487a, b, j, n, p.)

4341. FOSTER, L. J.
Fruit growing in Nyasaland.
Govt Printer, Zomba, Nyasaland, 1954, 8×6½ in., pp. 58, bibl. 27, illus., 4s. 6d.

Early plantings of fruit in Nyasaland were restricted to bananas, guavas, mangoes and papaws, but recently many other kinds have been extensively planted. This bulletin is intended as a general guide to fruit growing, and deals with the selection and preparation of sites, planting, subsequent management, pests and diseases, harvesting and nursery work. Brief notes are also provided on particular kinds of fruit, including almond, apple, apricot, avocado, banana, cape gooseberry, cashew, cherimoya, citrus, fig, granadilla, grape, guava, litchi, loquat, mango, mulberry, nectarine, olive, papaw, peach, pear, pecan, plum, quince, strawberry, tree tomato and youngberry.

4342. ZANZIBAR.
Annual Report of the Zanzibar Department of Agriculture, 1954, 1955, pp. 31, sh. 2.

Cloves. Work was started under the new scheme for the Experimental Control of Clove Diseases. The experiments are intended to ascertain whether plantations recently decimated by sudden death can be successfully replanted with cloves. It is hoped that one or more of the soil treatments being tried may enable the next generation of cloves to resist attack by the fungus that may prove to be the causal organism of sudden death, and which appears to manifest itself also in young trees in the form of "slow decline". At Kizimbani Experimental Station the valuable effects of side protection, overhead shade and particularly of clean weeding continue to be very noticeable in certain blocks of clove saplings which had recently been in danger from "slow decline". There appears to be good reason to suppose that "slow decline" depends partly on the physiological condition of the clove sapling. *Coconuts.* A solution of DDT and resin in a mixture of diesolene and kerosene shows promise for the control of *Pseudotheraptus wayi* (formerly *Theraptus* sp.); it also appears to discourage the newly introduced harmful ant *Anoplolepis longipes* and to encourage *Oecophylla longinoda*, a predator of *Pseudotheraptus*. *Pineapples.* Application of α-NAA to well-grown plants resulted in a crop of good fruit in the off-season about 5 months before the normal harvesting time.

4343. BALS, E. J., AND ROSE, G. J.
A future for oil-based sprays?
World Crops, 1955, **7:** 231-2, bibl. 4.

Examples are given of the successful use of oil-based fungicidal sprays against *Cercospora musae* on banana and of oil-based insecticidal sprays against *Theraptus* sp. [*Pseudotheraptus wayi*] on coconut. Droplet coverage and evaporation are discussed.

Bananas.

(*See also* 3438, 4340g, 4449i, v, 4462, 4468, 4479.)

4344. I.C.T.A.
Banana research scheme.
A.R. imp. Coll. trop. Agric., Trinidad, 1953-54, 1955, pp. 40-1.

Research included breeding and selection of new male parents, taxonomy of edible bananas, bract pigmentation, physiology of fruit development and cytogenetical studies.

4345. OPPENHEIMER, C., AND GOTTREICH, M.
Studies on growth and development of the dwarf banana in the Coastal Plain of Israel.
I. Comparative value of planting material of different sizes and from mother-orchards of different ages.
II. Comparative value of follow-suckers from young and old rhizomes.
III. Comparative value, as planting material, of suckers from young and old rhizomes.
Ktavim (English Ed.), 1954, **5:** 29-44, bibl. 2; 45-52, bibl. 6; and 53-5, bibl. 1.

A comprehensive research programme was started in 1947 to study the effects of ecological and cultural factors on the growth of the dwarf or Cavendish banana under the relatively cold winter conditions prevailing on Israel's Coastal Plain. Three trials on planting material gave the following results: I. The age of plantations, within the range of 1 to 4 years, from which suckers were taken did not affect the subsequent performance of the plants; the 3-year-old plantation material showed differences, but these must be attributed to locality and not to age. In general, larger suckers proved superior to small as regards flowering time, bunch size and subsequent sucker-production. II. In a comparison of followers water-suckers flowered an average of 30 days earlier than did sword-suckers of the same height, but they produced bunches with 1·4 fewer hands and 20% less weight. III. As planting material water-suckers gave as good results as sword-suckers; plants from the latter developed 1·4 more leaves, but there were no significant differences in height, flowering time or number of hands per bunch.

4346. HEWITT, C. W.
Leaf analysis as a guide to the nutrition of bananas.
Emp. J. exp. Agric., 1955, **23:** 11-16, bibl. 2.

In an attempt to determine the critical levels of the nutrient elements in the leaves of bananas, which can be correlated with fertilizer responses and maximum yield, a preliminary study was made of the optimum time and methods for sampling. This showed that the third leaf in the succession of leaves from the top of the plant was the best indicator of the nutritional status of the plant. The best time for sampling appeared to be as soon as the inflorescence of the plant emerged (the shooting stage). Samples of leaves, taken as outlined above from 3 fertilizer field experiments, showed that increased yields could be correlated with increased N content of the leaf. Where values of less than 2·60% N in the leaf were obtained a response to the application of nitrogenous fertilizer could be expected. The critical levels for P and K contents of the leaves could not be estimated so conclusively, because in these experiments there were no significant yield increases with P or K fertilizers. However, 0·45% P_2O_5 and 3·30% K_2O may be tentatively regarded as values above which no increased yield is likely to be obtained from the application of P and K respectively. [Author's summary and conclusion].—Dep. Agric., Jamaica.

4347. Merny, G.
Micro-essais de traitements contre *Cercospora musae*. (**Micro-tests of treatments against *Cercospora musae*.**)
Fruits d'Outre Mer, 1955, **10:** 225-35, bibl, 2, illus.

In micro-tests—16-circle, replicated modifications of the 4-circle tests previously described [*H.A.*, 25: 999]—24 fungicides were compared with the standard 50% copper oxychloride and a control. Cuprous oxide plus white oil and zinc Coposil plus white oil are both classified as possibly better than, and 12 others as equal to, copper oxychloride. A second experiment showed that the action of oil is to prevent the establishment of the fungus and thus delay the formation of the spots. In these experiments the fungicide in the oil had no effect, but it should not be concluded that it is unnecessary. The amount applied in the micro-tests was negligible and is far less than that which would be applied in a water-based spray.—I.F.A.C., Neufchâteau, Guadeloupe.

4348. Rishbeth, J.
***Fusarium* wilt of bananas in Jamaica. I. Some observations on the epidemiology of the disease.**
Ann. Bot. Lond., 1955, **19:** 293-328, bibl. 33, illus.

The banana wilt pathogen, *Fusarium oxysporum* f. *cubense*, can be detected in soil by a suitable host test. It often enters the host through living rootlets, from which it passes into the vascular strand of the main root and thence into the rhizome; apparently infection does not occur through dead roots. The spread of wilt through plantations was studied by taking records at 2-monthly intervals; new cases arise both spontaneously and in association with pre-existing ones. Flooding is probably important in local dispersal of the pathogen, as it is in long-range dispersal. The relative importance of some other modes of dispersal is discussed. The soil population of *F. oxysporum* f. *cubense* increases considerably when wilted bananas collapse and declines shortly after their removal. If the site is replanted with a banana variety resistant to wilt the pathogen can thereafter often be detected in the soil; in the absence of bananas, however, it cannot be detected by any test after about 10 years, although its continued survival is well established by many field observations on the incidence of banana wilt. Little is known about its mode of survival in soil. [Author's abstract].—W.I. Banana Res. Scheme, Dep. Agric., Jamaica.

4349. Gallego M., F. L.
El gusano de las cepas del plátano (*Castnia humboldti* Bdv.). (**The banana stem caterpillar, *Castnia humboldti*.**)
Agric. trop. Bogotá, 1955, **11:** 187-92, bibl. 1, illus.

The economic importance and biology of *Castnia humboldti* are outlined. Indirect control measures are avoiding susceptible varieties, not planting bananas near plantains, not inter-planting in sugar cane (another host), limiting the number of suckers, and thorough weeding.

4350. de Toledo, A. A.
Resultados de três ensaios de combate químico ao *Cosmopolites sordidus* Germ., bróca do rizoma da bananeira. (**The results of three trials on the chemical control of the banana borer, *Cosmopolites sordidus*.**)
Biológico, 1955, **21:** 57-63, bibl. 5.

Six chlorinated hydrocarbons, aldrin, γ-BHC, chlordane, dieldrin, lindane and toxaphene, were compared against *Cosmopolites sordidus*. The best treatment consisted of half-yearly applications of 20 g. 6% γ-BHC dust per stool.

Cacao.

(*See also* 3855, 4449c, j, l, m, q, w, 4479.)

4351. Voelcker, O. J.
Vorschläge zur Förderung des Kakaoanbaues in neuen Gebieten.* (**Suggestions for the promotion of cacao growing in new areas.**)
Gordian, 1955, **54** (1306): 6-7, (1307): 7.

In the opinion of the author, who was Director of Agriculture, Malaya, the present shortage of cacao can be overcome only by the extension of cacao growing to new territories, especially in south-east Asia. He invites chocolate manufacturers to become pioneers by establishing 500-acre plantations which would form the nucleus for perhaps 5,000 acres of native farms around them. The cost of establishment until the trees come into bearing is estimated at £100 per acre.

4352. Henderson, F. C.
Cacao as a crop for the owner-manager in Papua and New Guinea.
Papua N. Guinea agric. J., 1954, **9:** 45-74, bibl. 4, illus.

Comprehensive advisory notes are given on cacao growing in Papua/New Guinea. The chief subjects covered are spacing, temporary and permanent shade, sowing at stake, seed selection, under-planting mature coconuts, pruning, pest and disease control, fermentation, drying, marketing and costs. Scale drawings are presented of a fermenting box, fermentary layout with space for fermenting, drying, bagging and storage, and a sun dryer with sliding roof.

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* Paper read to a congress convened in Amsterdam by the Office International du Cacao et du Chocolat.

4353. I.C.T.A.
Cocoa research scheme.
A.R. imp. Coll. trop. Agric., Trinidad, 1953-54, 1955, pp. 41-4.

This report contains notes on: *Plant physiology:* rooting cuttings in baskets, containing a sawdust core in potting soil, in a centrifugal humidifier at 100% humidity; shade and fertilizer experiments; hormone assay by paper chromatography and coleoptile tests. *Biochemistry:* Fermentation. *Plant breeding:* Witches' broom resistance, I.C.S. clones. *Mycology:* Witches' broom and black pod. *Entomology:* Mealy bugs and thrips. *Soils:* Physical, chemical, ecological, cultural and nutritional investigations.

4354. García Becerra, C.
Las investigaciones en cacao. **(Cacao research.)**
Cacao en Colomb., 1954, **3:** 11-19, bibl. 11.

Investigations conducted by the National Cacao Company of Colombia in 1954 on selection, vegetative propagation, physiology and diseases are summarized and the programme for 1955 is outlined.

4355. Pérez, J. M. O.
Experimentos comparativos entre siete medios de enraizamiento para estacas de cacao. **(Experiments on seven methods of rooting cacao cuttings.)** [English summary ¼ p.]
Cacao en Colomb., 1954, **3:** 75-91, bibl. 26, illus.

Fresh and decomposed rice husks and sand gave the highest strikes, 84·5, 86·5 and 63·5% respectively, followed by fresh sawdust, vegetable charcoal, decomposed wood and decomposed sawdust. Fresh rice husks gave more rapid rooting and better lateral root development than sand and needed only one watering per day when used in a Fiester-modified, Trinidad propagator.

4356. García Brand, J. R.
Efecto del Dithane Z-78 y del ácido 3-indol butírico en el enraizamiento de estacas de cacao. **(Effect of Dithane Z-78 and indolebutyric acid on the rooting of cacao cuttings.)** [English summary 13 lines.]
Cacao en Colomb., 1954, **3:** 157-66, bibl. 12, illus.

The best of 7 treatments was the immersion of cuttings in zineb (Dithane Z-78) solution (32 g. per 4 gal. water) followed by dipping their bases in IBA (5 mg. per cc. 50% alcohol). In 2 tests this treatment gave rooting indices of 2·14 and 1·02 respectively compared with 1·44 and 0·44 in the controls.

4357. Varón Caicedo, L. A.
Trasplante directo al suelo de estacas de cacao enraizadas. **(Direct transplanting of rooted cacao cuttings.)** [English summary ½ p.]
Cacao en Colomb., 1954, **3:** 113-22, bibl. 5, illus.

Six treatments were compared in an experiment to determine the feasibility of transplanting rooted cuttings, hardened off in the propagator, direct into the field. Filling the planting hole with compost and with compost plus sand gave the best takes, 99 and 91%, followed by planting in the natural soil of the planting site, 83%.

4358. de Verteuil, L. L.
Further observations on a trial of trees as shade for cacao.
Trop. Agriculture Trin., 1955, **32:** 241-3, bibl. 1.

Further observations are recorded on the performance of 15 tree species compared in an area of land (low-lying, liable to flood and heavy rainfall) where the "Bocare Immortelle" (*Erythrina glauca*) and, to a lesser extent, the "Anauca Immortelle" (*E. poeppigiana*), are liable to suffer from a fungus disease associated with *Calostilbe striispora*. It is found that *Parkia roxburghii* and *Schizolobium excelsum*, which appeared promising in 1945 when five years old [see *H.A.*, 16: 473] have developed unfavourable characteristics which preclude them from meeting the requirements of a good shade tree. Jiggerwood (*Bravaisia integerrima*) is not a suitable shade tree in that it tends to interfere with the normal growth of the cacao tree. It is confirmed that *Peltophorum ferrugineum* is worthy of further trial as a shade tree. The necessity for controlling the canopy by pruning is stressed. None of the species of trees in the trial is as suitable for shading cacao as *Erythrina glauca*. [Author's summary].—Dep. Agric., Trin. Tob.

4359. Naundorf, G.
Nuevas contribuciones al estudio de la auto-incompatibilidad en cacao. **(New contributions to the study of self-sterility in cacao.)** [English summary ½ p.]
Cacao en Colomb., 1954, **3:** 63-72, bibl. 30, illus.

Self-sterility is very common in cacao in Colombia, especially in the Cauca Valley. The following methods have proved successful in increasing yields: (1) budding a basal chupon of a self-sterile tree with material from a selected, high-yielding tree and eliminating the mother tree in due course; (2) artificial pollination with pollen from a self-fertile tree; (3) patch-budding with a bark-patch carrying a flower cushion from a compatible tree.

4360. Mosquera, E. C.
Aspersión combinada nutritiva, fungicida y hormonal en cacaotales. **(Combined nutritive, fungicidal and hormonal spraying in cacao plantations.)** [English summary 7 lines.]
Cacao en Colomb., 1954, **3:** 107-12, bibl. 9.

Applying a commercial foliar spray containing NPK and a fungicide [no hormone is mentioned] to Forastero and grafted clonal cacao twice in the season reduced cherelle wilt by 13 and 9% respectively, increased pod yield, and raised the weight of fresh beans by 27 and 37% respectively.

4361. González H., C. A.
Contribución a la polinización artificial en el cacao. **(Contribution on the artificial pollination of cacao.)** [English summary 9 lines.]
Cacao en Colomb., 1954, **3:** 167-82, bibl. 10, illus.

Two new, rapid methods of artificial pollination, tested with completely negative results, were: (1) the application to the stigma of a suspension of pollen grains in distilled water, with or without added potassium permanganate, potassium carbonate, activated charcoal, glucose plus sucrose, or yeast; (2) blowing air into the flower to ensure self-pollination.

4362. Miller M., R.
Un nuevo factor para el marchitamiento de frutos jóvenes de cacao. **(A new cause of cherelle wilt in cacao.)**
Cacao en Colomb., 1954, **3:** 209-11, bibl. 1.

Cherelle wilt in pods 0·5-1·5 cm. long was raised from 23% to 38% by one light tap and to 78% by two taps, and was also greatly increased by drops of water falling on the pods. For example, water dripping for 3 hours on pods of 0·5, 1·0 and 1·5 cm. long gave 100, 90 and 40% wilt respectively compared with 11, 0 and 0% in the controls, but did not increase incidence in fruits of 2·0-3·0 cm. in length.

4363. van der Knaap, W. P.
Invloed van het rampassen op de productie van cacao-bomen. **(Influence of "stripping" on yield capacity of cacao trees.)** [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1955, **24:** 219-23, 247-55, bibl. 8.

Stripping cacao trees of all their pods once a year has been a standard control measure against the cacao moth, *Acrocercops cramerella*, for over 50 years. Now that chemical control seems possible [see abstract 4368 below] it is desirable to evaluate the loss of crop caused by stripping. A comparison of stripped and non-stripped, 5- and 10-year-old, budded trees showed that pod losses from stripping could be as high as 44% of the average yield. Yield loss was especially severe when stripping was done just after fruit setting. Clones which are strong periodic-flowerers were also seriously affected by early stripping. Stripping had no effect on wet bean weight per pod.

4364. Anon.
Controlling black-pod in Western Nigeria.
New Commonw., 1955, **29:** 537-8, illus.

Control is obtained by spraying the pods at 3-weekly intervals from May to November with 1% carbide-bordeaux, viz. 1 lb. copper sulphate and ½ lb. calcium carbide to 10 gal. water. The amount of spray required per acre ranges from about 20 gal. at the beginning of the season to about 50 when the main crop is on the trees. [See also *H.A.*, 23: 4584 and 24: 1960.]

4365. Idrobo Mazorra, S.
Represión del *Colletotrichum theobromicolum* Delacroix en *Theobroma cacao* L. **(Control of *Colletotrichum theobromicolum* on *Theobroma cacao*.)** [English summary ½ p.]
Cacao en Colomb., 1954, **3:** 141-56, bibl. 9, illus.

Dithane Z-78 improved rooting in diseased cuttings and was the best of 4 fungicides tested for protecting young plants raised from cuttings from infection.

4366. Naundorf, G.
Contribuciones al problema de la moniliasis en cacao. **(Contributions to the problem of monilia pod rot in cacao.)** [English summary 1¼ p.)
Cacao en Colomb., 1954, **3:** 35-61, bibl. 10, illus.

A summary of the results of the studies made in 1954 is as follows: (1) *Effect on yield:* Artificially pollinated flowers dusted with spores of *Monilia roreri* gave 19% pods compared with 67% in the controls. (2) *Cherelle wilt* was commoner in trees with many infected pods and was increased by fungicidal spraying. (3) *Role of pentatomid bugs:* All diseased pods showed insect punctures, 2 pentatomids being common on the pods. Spore-dusted pods bagged with and without pentatomids showed 77 and 16% disease respectively after 6 weeks. Artificially punctured pods inoculated with aqueous pentatomid extract showed 58-66% disease development in 14 weeks compared with 46% in uninoculated pods. (4) *Control:* Recommendations are weeding, pruning and the regular removal of diseased pods [see also *H.A.*, 24: 3134], and spraying fungicides onto the soil.

4367. van Suchtelen, N. J.
Topsterfte bij cacao in de kwekerij. **(Die-back of cacao in the nursery.)** [English summary 2 lines.]
Surinaam. Landb., 1955, **3:** 223-4.

Phytophthora wilt of young cacao leaves is reported from Surinam. Spraying with a copper fungicide should control the disease.

4368. Laoh, J. P.
De huidige stand van het cacaomot-vraagstuk. **(The current position in the cacao moth problem.)** [English and Indonesian summaries 1 and 1½ p. respectively.]
Arch. Koffiecult., 1955, **17:** 241-73, bibl. 23.

An endrin spray programme of 16 applications gave satisfactory control of *Acrocercops cramerella* on cacao. Knapsack sprayers did not give sufficient coverage in mature plantations, motor sprayers being better. Fruit setting in sprayed areas was normal. The danger of increased natural resistance of the pest can be checked by temporarily replacing chemical control by "stripping" the trees. [See also abstract 4363 above and *H.A.*, 25: 2145.]

4369. Kaden, O. F.
Electric hygrometer for cocoa, coffee, chocolate pastes, and fillings.
Gordian, 1955, **54** (1305): 74-5, illus.

A portable hygrometer of camera size, fitted with batteries, has been adapted for use on cacao beans. The instrument, which is described and illustrated, gives quick and accurate readings of the moisture content of cacao beans both during fermentation and after bagging. Further developments should make it possible to measure the moisture content of green and roasted coffee in a similar manner.

4370. Haines, C. E., and Echeverria, A. J.
Cacao pods as a substitute for corn in tropical dairy rations.
Foreign Agric., 1955, **19:** 99-101.

In feeding trials on dairy cows and pigs in Panama, Costa Rica and Honduras dried cacao pod meal proved a satisfactory substitute for maize, 100 lb. of pod meal being equivalent to 96-97 lb. of chopped maize ears. A composite sample of pod meal contained 12·6% moisture, 7·58% ash, 8·11% protein, 34·82% crude fibre, 3·29% fat and 33·59% N-free extract. Cacao pod meal has been produced in Panama by holding pods in Gordon dryers for 42 hours at 180°F. to reduce moisture to about 4% and then pulverizing them in a hammer mill. About 2 lb. of meal can be produced for each pound of dried cacao beans.—United Fruit Co., La Lima, Honduras.

Coconuts.

(*See also* 3438, 3459, 3854, 4449o, 4450g, 4462, 4468.)

4371. Liyanage, D. V.
Controlled pollination of coconut palms.
Ceylon Coconut Quart., 1954, **5:** 135-8, illus.

Advice is given on selection and preparation of parents, bags and bagging, pollen and pollen storage and pollination.

4372. Martyn, E. B.
Diseases of coconuts.
Trop. Agriculture Trin., 1955, **32:** 162-9, bibl. 23.

The major epidemic diseases, of which the cause is not yet known and with which no parasite has been associated, are described. Four in number, they are shown to fall into two distinct categories, with two somewhat similar diseases in each, bronze leaf wilt and the "unknown disease" in the one, root disease and "cadang-cadang" in the other. The minor diseases of coconuts are referred to, some of which appear to have been described under different names, though in fact much alike, and the majority of which are not primarily attributed to parasites. The known major parasites of coconuts (*Phytophthora palmivora* and the eelworm *Aphelenchoides cocophilus*) are shown not normally to cause widespread epidemic loss. [From author's summary.]

4373. van Dinther, J. B. M.
De cocosbladrups *Brassolis sophorae* L. en zijn bestrijding. (**The coconut pest *Brassolis sophorae* and its control.**) [English summary ¾ p.]
Surinaam. Landb., 1955, **3:** 209-16, illus.

The life history of *Brassolis sophorae* is described. All stages of the caterpillar were susceptible to 0·1% DDT. The use of power sprays and dusters was not economic, owing to the height of the trees, irregular planting, and uneven surface. Wheelbarrow and hand sprayers gave the best coverage, when operated by one man at the pump maintaining pressure and another climbing the trees with the spray gun. Collection and burning of the leaf nests is also recommended.

4374. W., C. A.
The stinging caterpillar. A note on *Parasa lepida*.
Ceylon Coconut Quart., 1954, **5:** 169-70, illus.

Parasa lepida, an occasional pest of coconut leaves, is controlled naturally by parasites, but these only appear after some damage has been done. DDT emulsion gave complete control.

4375. Vilaca, E. da C.
The copra quality problem.
[*Proc.*] *int. Ass. Seed Crushers Congr. 1955*, Baden Baden, pp. 3.

For the production of good quality copra the nuts must be harvested at the moment of maturity. The following points are also stressed: the importance of maturing in heaps before drying; the value of properly constructed drying apparatus; and the need for bagging, which helps to avoid contamination.

4376. Chipperfield, G.
Quality of Pacific Islands copra (a résumé of the current position.)
[*Proc.*] *int. Ass. Seed Crushers Congr. 1955*, Baden Baden, pp. 2.

The various standards of copra and methods of preparation in the Pacific Islands are discussed. The necessity for improving quality is emphasized.

Coffee.

(*See also* 3854, 3857, 3858, 4369, 4449e, s, x, z, 4450a, 4470, 4476.)

4377. Dwyer, R. E. P.
Coffee cultivation in Papua and New Guinea.
Papua N. Guinea agric. J., 1954, **9:** 1-5, bibl 5.

This short article introduces a forthcoming series on coffee growing in Papua and New Guinea. The following topics are briefly discussed: botany, history of the industry in the Territory, varieties, plantation practice, and maturity and longevity of the tree.

4378. Henao Jaramillo, J.
La industria cafetera en Venezuela. (**The coffee industry in Venezuela.**)
Agric. venezol., 1955, **19** (175): 6-11; (176): 8-9; (177): 7, 11.

This article includes information on production, exports and internal consumption, acreage, yields per tree and per ha., varieties, commercial grades, production costs, distribution, pests, diseases and processing.

4379. Station de Recherches Agronomiques de Mulungu-Tshibinda.
La caféier d'Arabie. Plantation—entretien—récolte. (**Arabica coffee: planting, maintenance, harvesting.**)
Bull. Inf. INEAC, 1955, **4:** 129-50, illus.

Aspects dealt with include: seedbeds and nurseries, preparation of the soil for planting, soil conservation, cover crops and permanent shade, planting (ball, bare-root, stumps), organic manuring, mechanized maintenance, maintenance of young and bearing crops, training (single and multiple stem), renewal pruning, changing from single to multiple stem pruning, harvesting, fermentation and drying.

4380. Kenya Coffee Board.
Annual report and accounts of the Coffee Board of Kenya for the year ended 31st March, 1955.
Mon. Bull. Coffee Bd Kenya, 1955, **20:** 117-27.

The report includes brief research notes on variety trials, tonic copper spraying, nitrogen and grass mulch, disease and pest control, spraying to prevent leaf-fall, weed control, green-vein chlorosis, processing and irrigation.

4381. Temponi, F.
Descope de cafetos en almácigos. **(Tipping coffee in the nursery.)**
Agric. venezol., 1955, **19** (174): 42, illus.

Tipping nursery plants above the third pair of leaves is recommended. This causes the plant to produce only 2 leaders, whereas tipping later in life results in the production of abundant chupons which require constant pruning and care.

4382. Cooil, B. J.
Plant physiology. Coffee.
Bienn. Rep. Hawaii agric. Exp. Stat., 1952/54, 1955, pp. 47-8.

For the coffee tree the starch concentration in the leaves can be used as a primary index of carbohydrate balance. The concentration of starch in the leaves at the time of flowering and early fruit development is closely correlated with the yield obtained later the same year. During the period of rapid fruit development a heavily bearing tree becomes depleted of starch. After the fruit has developed, starch accumulates if environmental and nutritional factors are not limiting. "Black bean" in coffee is associated with close spacing, light pruning, lack of sunlight and low leaf starch. This disorder is apparently a symptom of carbohydrate deficiency during the period of fruit development. Early results from a large-scale fertilizer experiment at Kona Branch Station show that frequent applications of N will aid in maintaining a high level of K in trees during the harvest season. This practice should prove important in preventing dieback and in minimizing the tendency to bear biennially.

4383. Bonnet, J. A., Riera, A. R., and Roldán, J.
Radioactive studies with P^{32} in tropical soils and crops of Puerto Rico.
Proc. Soil Sci. Soc. Amer., 1955, **19**: 283-4, bibl. 4.

Superphosphate, containing P^{32}, was applied to young coffee trees on Catalina clay in fertilizer placement studies. The percentage absorption of P from the fertilizer was significantly greater when it was broadcast over the whole area or over a 2 ft. wide outer segment of the canopy area than when it was applied in bands, in holes or over the half-moon terrace area above each tree. The leguminous shade trees absorbed part of the P applied to the coffee.—Univ. Puerto Rico.

4384. Indian Coffee Board Research Department.
Common and uncommon diseases and pests of arabica and robusta coffee, their treatment and remedies.
Indian Coffee, 1955, **19**: 62-3, 80-2, 100-3, 122-6, illus.

The diseases covered are rust (*Hemileia vastatrix*), black rot (*Pellicularia koleroga*), dieback, brown root disease (*Fomes noxius*), damping-off (*Rhizoctonia* sp. and *Fusarium* sp.) and 6 named but uncommon diseases. The pests are *Xylotrechus quadripes*, *Xyleborus morstatti*, *Lecanium viride*, *Pseudococcus citri*, *Zeuzera coffeae*, cutworms and eelworms.

4385. Abrahão, J.
Cafés manchados. **(Discoloured coffee.)**
Biológico, 1955, **21**: 87-90.

In São Paulo coffee cherries harvested during rain sometimes show a reddish or greenish discoloration which adversely affects grading and flavour. The discoloration, which is more common in cherries collected from the ground than from the trees, was found to be due to fungus infection, mainly by *Fusarium* sp. and *Aspergillus* sp.

4386. Valenzuela V., G. O.
Control cultural *vs.* control químico en el combate de la hormiga de amaga (*Rhizomyrma* spp.) y cóccidos radiculares asociados del cafeto. **(Cultural *vs.* chemical control of ants, *Rhizomyrma* spp., and of root mealybugs on coffee.)**
Bol. inf. Colombia, 1955, **6**: 169-76, bibl. 6, illus.

The treatments used in a replicated experiment at the Esteban Jaramillo substation in Antioquia were (1) cultivation plus 10 gal. decomposed coffee pulp per tree, (2) cultivation plus soil application of 4 l. 1‰ Aldrex-2 per tree, (3) weeding plus Aldrex-2 as above. Results were: (1) cultural treatment gave no control, (2) Aldrex-2 controlled the ant but did not eradicate it completely at the concentration used, (3) chemical treatment was much more effective and economical on uncultivated soil with the weeds brushed than on cultivated soil, (4) the insecticide did not affect the rate of shoot growth.

4387. Llewelyn, D. A. B.
Coffee drying. A summary of a preliminary report to the Coffee Board of Kenya.
Mon. Bull. Coffee Bd Kenya, 1955, **20**: 153-9.

The theoretical and practical requirements of coffee drying are discussed. The 3 arbitrary stages are: (1) from fully wet (60-65% water) to skin dry (45-60%); (2) to just past the black stage (15-20%); (3) to the correct moisture stage for hulling (11%). The methods of drying recommended are sun drying on draining tables for stage 1, bed dryers for stage 2, and conditioning bins or bed dryers allowed to run cold near the end for stage 3. Advice is given on the storage of parchment coffee at different altitudes, and sun drying at the 3 stages is compared with artificial drying in drum dryers, bed dryers or grain dryers, and in conditioning bins.

4388. Calle V., H.
Pruebas químicas para determinar la calidad del café. **(Chemical tests for quality in coffee.)**
Bol. inf. Colombia, 1955, **6**: 158-60.

Notes are given on (1) a haematoxylin test for degree of fermentation, (2) colorimetric maturity tests with hydrochloric acid followed by resorcinol and with sodium hydroxide, (3) Schweitzer's ammonia-copper test for method of drying, (4) a silver nitrate test to confirm the homogeneity, as regards source and processing, of beans in a given sample, and (5) an ultraviolet radiation test for oil content.

4389. Rogerson, A.
Nutritive value of coffee hulls.
E. Afr. agric. J., 1955, **20**: 254-5, bibl. 1.

Analyses showed that coffee hulls are not suitable either as basic sheep feed or as a concentrate supplement. The digestible protein content was low and the starch equivalent did not exceed that of rather poor quality hay.

Mangoes.

4390. Buell, E. P.
Flowering and fruiting habits of the mango in the wet zone.
Trop. Agriculturist, 1954, **110:** 280-4, bibl. 1.

The results are given of the following treatments applied to a number of varieties at Peradeniya: (1) ringing, (2) fibrous root pruning, (3) tipping and thinning, (4) removal of leaves flushing in October at branch tips, (5) lighting smouldering fires under the trees during the pre-flowering period, (6) PK fertilization, and (7) sodium chloride fertilization. Tentative conclusions drawn were: (1) Polyembryonic varieties are more fruitful in the wet zone than monoembryonic; (ii) Fruit production in a variety is inversely correlated with flush number per year; (iii) Flowering on *Kohu-amba* rootstock is more profuse than on *Wal-amba*; (iv) The *Cambodiana* and the *Sandershah* groups flower and fruit best; (v) Late varieties that flower in February-March are the most suitable for the wet zone; (vi) Varieties with a "whole tree flush" are the most fruitful, but show a tendency to biennial bearing.

4391. Singh, S. M.
Malformation disease of mango (*Mangifera indica* (Linn.)
Curr. Sci., 1955, **24:** 168-9, bibl. 8.

A malformation disease of mango shoots, particularly of the inflorescence, has recently become serious. Two species of mite, *Tyrophagus castellanii* and *Typhlodromus* (*asiaticus?*), which infest mangoes, have been found to cause the characteristic symptoms on both inflorescences and shoots. Attempts at control have so far been unsuccessful.—Govt. Fruit Res. Stat., Saharanpur.

Oil palms.

(*See also* 4449a, 4450e, j.)

4392. W.A.I.F.O.R.
Second Annual Report of the West African Institute for Oil Palm Research, 1953/54,
1954, pp. 99, 2s. 6d.

The work of the research divisions includes: *Agronomy:* establishment, field experiments [see abstract 4395]. *Chemistry:* soil and oil investigations. *Plant Breeding:* breeding, selection, segregation studies, seed selection and trials, fruit form, the Deli palm, pollination. *Plant Pathology:* diseases of seedlings and mature palms, pests. *Plant Physiology. Plant Production. Statistics.*

4393. Donkersloot, M. E.
Misvormingen bij oliepalmen. (**Malformation in oil palms.**) [English and Indonesian summaries ¼ and ½ p. respectively.]
Bergcultures, 1955, **24:** 267-78, 295-304, illus.

Malformations occurred in F_1 and F_2 progeny of Marihat Deli dura and Import tenera mother trees. "Crown disease" occurred almost entirely in Deli dura × Deli dura and particularly in the F_2 generation from healthy F_1 progeny. Other malformations occurred largely in Import tenera × Import tenera by crossing Import tenera with Deli dura the percentage of these was reduced. It was concluded that predisposition to malformation was genetical, and that the combination of parents chosen was of more importance than the selection of individual parents.—Proefstat. A.V.R.O.S., Medan.

4394. Marynen, T., and Bredas, J.
La germination des graines d'*Elaeïs*. (**Germinating *Elaeis* seed.**)
Bull. Inf. INEAC, 1955, **4:** 155-76, bibl. 6, illus.

The results and conclusions from experiments on the germination of oil palm seeds in a germinator were: (1) Packing in charcoal and fungicidal treatment of the seeds are harmless but unnecessary. (2) For a given type of germinating box the shallower the layer of seeds plus charcoal and the fewer the seeds, the better the germination. (3) Germination begins more slowly in coarse charcoal than in fine but becomes more rapid in the former later on and the final percentage of plants is greater. (4) The extent of loss of viability is directly related to the number of occasions on which the temperature exceeds 42°C.; temperature should be maintained at 35-36°C. (5) In a germinator specially treated to ensure a low mean daily temperature and good aeration the germination rate at 20 weeks was 81% compared with 46% under normal treatment. (6) In an aeration test the germination rate of the best aerated seeds was 64-76% compared with 44-50% under normal treatment. (7) In an alternating-temperature test on seeds, which had previously given only 1·8% germination in 6 months, the germination rate at 25 weeks after alternating long periods in store and short periods in the germinator was 31% compared with 1·8% after alternating short periods in store and long periods in the germinator. These results were tested in a final experiment embodying the lessons learned. Germination rates after 20 weeks were 83-91%. Notes are given on the dimensions and construction of germinators and seed boxes.

4395. W.A.I.F.O.R.
Agronomy Division. Field experiments.
A.R. W. Afr. Inst. Oil Palm Res. 1953/54, 1954, pp. 39-60.

(1) *Treatment of felled bush.* Burning *vs.* non-burning—Main Station (planted 1940): By 1953 burning had given a slightly higher annual and total yield. (2) *Selection of planting material.* Seedling selection—Main Station (1951): growth was significantly less in the "most vigorous seedlings from those which germinated early" than in 4 other vigour classes. (3) *Establishment methods.* Establishment—Main Station (1940): early intercropping has not yet had a harmful effect on yield. Establishment—Nkwele (1943): to date continuous intercropping plus manuring has given 40% more, intercropping every 4 years slightly less and annual slashing of natural cover 24% less yield than the control

Establishment—Sub-station (1951): of 5 burning *vs.* non-burning plus varied soil treatments, burning plus continuous culture has given the significantly highest leaf production. (4) *Spacing.* Spacing/grazing/intercropping—Main Station (1945): close spacing of 21 ft. triangular still gives the highest yields but 21 × 40 ft. (51·9 per acre) is now outyielding 12 × 65 (55·8); in 1953 annual and total yield were highest with *Pueraria*, intermediate with natural cover and lowest with elephant grass. (5) *Manuring.* Three-level manurial.—Main Station (1948): N without FYM and FYM without N gave negative responses but N plus FYM gave a considerable yield increase. Fertilizer—Umudike (1925): the single 5 cwt. of K applied 5 years previously gave 70% yield increase over the control in 1953. Potash-Akwete (1929); K, applied annually since 1949, gave a considerable yield increase in 1953, 6 lb. giving as much as 12 lb. Bunch refuse—Main Station (1949): no effect so far. (6) *Pruning.* Pruning—Nsugbe (1933 and 1936): Of 4 practices compared since 1952 severe pruning reduced yields heavily and the Nnewi method (pruning all leaves lower than the one subtending the first female, or the first unopened male, bunch, or, if no bunches, all leaves except the spear and a ring of 5-6) also reduced yields. (7) *Replanting.* Poisoning old palms: 6 oz. sodium arsenite per palm introduced into holes bored in the trunk gives a reasonable % kill but death takes much longer than with Deli palms in Malaya. (8) *Maintenance of soil fertility.* Soil cover—Main Station (1944): clean weeding considerably reduced soil fertility.

4396. SURRE, C.
Densité économique de plantation pour le palmier à huile. **(Economic density in oil palm plantations.)**
Oléagineux, 1955, **10:** 411-13, bibl. 1, illus.

Production costs are analysed under harvesting costs, maintenance costs, amortization of plantations, and profits from young plantations. At La Mé [see *H.A.*, 25: 2180] reducing the density from 139 to 125 palms per ha. gave a reduction of only 1% in production but reduced harvesting costs by 3%, maintenance costs by 8% (or 15% with mechanization) and establishment costs by 4-5%. It is considered that, in general, the economic density should be less than the optimum density to reduce cultural expenses and thus production costs, and that the higher production at an early age achieved by denser planting is offset by the added expense and the reduced production in later years.

4397. VERNON, J. R.
The improvement in quality of Nigerian oil and oilseeds.
[*Proc.*] *int. Ass. Seed Crushers Congr. 1955*, Baden Baden, pp. 10 plus appendices.

Export of oil and oilseeds from Nigeria is controlled by the Government through a system of Marketing Boards which work closely with the Government Produce Inspection Scheme. The standards laid down, and the methods of testing and of sealing inspected produce are briefly summarized. Grades of palm oil for export are based on free fatty acid content; since their introduction oil quality has improved and this has resulted in elimination of the poorer grades and improvement in the better ones.

Papaws.

(*See also* 4449t.)

4398. WARMKE, H. E., CABANILLAS, E., AND CRUZADO, H. J.
A new interspecific hybrid in the genus *Carica.*
Proc. Amer. Soc. hort. Sci., 1954, **64:** 284-8, bibl. 7, illus.

A number of attempts to produce interspecific hybrids in the genus *Carica* have recently been made in the papaw breeding programme at the Federal Experiment Station, Puerto Rico. The only successful cross so far has been between the dioecious species *Carica goudotiana* (used as female) and the monoecious species *C. monoica*. F_1 hybrids were found to be intermediate in most vegetative characters but were monoecious in sex type. The hybrids were highly fertile and set large numbers of fruit containing viable seeds. F_2 plants segregated widely for vegetative characters and sex type.

4399. DAS, D. P., SIDDAPPA, G. S., AND LAL, G.
Effect of extraction of papain on the pectin content of raw papaya.
Bull. centr. Food tech. Res. Inst. Mysore, 1954, **3:** 300-1, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (6), *Suppl. Fruits trop. subtrop.*, No. 12-10499.

Experiments showed that, regardless of the stage of maturity of the fruit, incision for the extraction of papain did not reduce the pectin content.

Rubber trees.

(*See also* 3854, 4449g, u, 4450f.)

4400. RUBBER RESEARCH INSTITUTE OF CEYLON.
Report of the Work of the Rubber Research Board in 1954, Colombo, 1955, pp. 141.

Work reported from the Institute includes: *Chemistry:* Approximate determination of d.r.c. of fresh and ammoniated latex, prevention of coagulation, Mg and Cu content of latex. *Botany:* Breeding and selection, clonal, clonal seedling and budded rubber trials, bud grafting, crown budding, hedge planting. *Mycology:* Oidium control. *Agronomy:* Manuring.

4401. CONSTABLE, D. H.
Clone PB.86
Quart. Circ. Ceylon Rubb. Res. Inst., 1955, **31:** 1-7.

PB.86 can yield 1500-2000 lb. per acre in commercial plantings in all districts of Ceylon but in a recent census the high-yielding areas represented only 13% of the whole and gave only 18% of the total yield. Recommendations are made concerning cultural practices which will lead to higher yields.

4402. PAARDEKOOPER, E. C.
Eerste resultaten van de meeldauwresistentieselectie bij hevea. **(Preliminary results of selection for mildew resistance in hevea.)** [English and Indonesian summaries 16 and 18 lines respectively.]
Bergcultures, 1955, **24:** 319-23, bibl. 4.

Trials aimed at combining the mildew resistance of LCB 870 with high-yielding capacity have given first results. A clear correlation between defoliation behaviour and mildew resistance was found, in that clones which started defoliation early showed only light to moderate mildew attacks. Pot studies with several clones and illegitimate seedlings of LCB 870 showed distinct variability in mildew resistance both between and within the clones. Clones of high-yielding progeny of LCB 870, which were equally or more resistant to mildew than the parent, have been selected for further trial. Seedlings of the cross LCB 1320×LCB 870 showed a relatively higher mildew-resistance than LCB 1320.—Proefstst. C.P.V., Bogor.

4403. Beaufils, E. R.
Mineral diagnosis of *Hevea brasiliensis.* [Indonesian and Dutch summaries 4 and 3 pp.]
Arch. Rubb. Cult., 1955, **32:** 1-47, bibl. 29.

This paper contains the same material as that to which *H.A.*, 25: 3313 refers, but provides additional information on leaf mineral composition as related to fertilizer treatment, physiological tapping disorders and yield.

4404. Bolle-Jones, E. W.
Tentative method of sugar estimation in laminae and its application to *Hevea brasiliensis.*
Physiol. Plant., 1955, **8:** 1-7, bibl. 8, illus.

The preparation of sugar-containing extracts from the laminae of *Hevea brasiliensis* is described and a one-dimensional descending chromatographic method of estimating the individual sugars is given. The method is simple and specific and has been applied to the preliminary investigation of the effect of varied mineral nutrient status on the sugar content of the laminae of *Hevea*; these results are described briefly. [From author's summary.]—Rubb. Res. Inst., Malaya.

4405. Baptist, E. D. C.
Stimulation of yield in *Hevea brasiliensis.* I. Prewar experiments with vegetable oils.
Baptist, E. D. C., and de Jonge, P.
Stimulation of yield in *Hevea brasiliensis.* II. Effect of synthetic growth substances on yield and on bark renewal.
de Jonge, P.
Stimulation of yield in *Hevea brasiliensis.* III. Further observations on the effects of yield stimulants.
J. Rubb. Res. Inst. Malaya, 1955, **14:** 355-61, bibl. 4, 362-82, bibl. 8, illus., and 383-406, bibl. 15, illus, being *Communs.*, **294-296.**
Anon.
Yield stimulation with 2, 4, 5-T.
Plant Bull. R.R.I.M., 1955, No. 19, pp. 75-8, bibl. 1, illus.

The first paper gives a historical review of methods of latex stimulation and describes early Malayan experiments.

In the second paper an account is given of experiments begun in 1951. Application to lightly scraped bark below the tapping cut of a number of synthetic growth substances in an oil vehicle resulted in increases in yield and in the thickness of renewed bark above the cut. Repeated applications at six-monthly intervals over a period of three years did not result in an increased incidence of "dry" trees, but the yield response was found to decrease with each successive treatment. The best results were given by 1% n-butyl ester of 2,4,5-T. In another trial monthly treatment with yield stimulants applied to renewing bark just above the tapping cut also resulted in greatly increased yields and in an increase in thickness in the non-latex-bearing tissues of the outer bark. In this trial 1% 2,4-D in palm oil and Stimulex have given the best results over 2 years. In a new experiment 4 treatments with 1% n-butyl ester of 2,4,5-T in palm oil and petrolatum grease are being compared. These are (i) 6-monthly applications to a 3-inch strip of (a) lightly scraped and (b) unscraped bark below the cut, and (c) lightly scraped bark on a half circumference of the stem 5 ft. above the panel, and (ii) monthly applications above the cut to the width of the bark excised the previous month. The first 3 months' results show the benefit of light scraping, the small effect of treatment high above the panel and the pre-eminence of monthly treatment.

In the third paper certain factors influencing the response of hevea trees to yield stimulants are discussed, namely condition of bark, clonal characteristics, tapping systems and amount of growth substance per tree. The following effects of treatment are also discussed: the low incidence of brown bast, changes in bark anatomy, increased rate and duration of latex flow, slight decrease in d.r.c. and slight increase in Cu content of latex.

The fourth paper contains practical recommendations for the use of 2,4,5-T with various tapping systems.

4406. Wiersum, L. K.
Resultaten van een proef over herhaalde stimulering van de latexproductie. (**Results of an experiment on repeated stimulation of latex production.**) [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1955, **24:** 353-7.

In a plantation of mixed clones (planted in 1935-36) 5 successive applications of Stimulex at intervals of about 6 months induced yield increases averaging 20% each time. Bark renewal was not retarded. The growth increments of treated trees were smaller than those of the controls. In an old seedling plantation Stimulex applications also had a favourable effect on production, the effect usually lasting for more than 4 months.—Proefstat. C.P.V., Bogor.

4407. Tideman, P.
The significance and use of tapping-panel dressings. [Dutch and Indonesian summaries ¾ p. each.]
Arch. Rubb. Cult., 1955, **32:** 49-74, bibl. 11.

Of 4 dressings applied fortnightly for a year only TB 192 [composition not stated] gave a significant yield increase (13%). The increases were cumulative with TB 192 and a compound containing mercury naphthenate and α-naphthaleneacetic acid. Bark renewal was distinctly better in all treated trees than in the controls, especially when coal tar was used, although this material gave a decrease in yield in very dry months and the same mean annual yield as the control. Costs are discussed.—Exp. Stat. C.P.V., Bogor, Indonesia.

4408. Resing, W. L.
Variability of hevea latex. [Indonesian and Dutch summaries 4 and 3½ pp.]
Arch. Rubb. Cult., 1955, **32:** 75-212, bibl. 170.

The investigation deals with some aspects of the variability in composition and stability of hevea latex, especially with regard to clonal latices. After a review of the main literature on this subject, attention is focused on clonal latices originating from different locations. Special attention has been paid to the phosphorus and magnesium content and to the question whether clonal latices can be classified according to stability. In concentrated latices mechanical stability has been the principal factor considered. The importance of the protein-fatty-acid interaction for their stability is stressed. [From author's summary.]—Found. Rubb. Res. Dev., Bogor, Indonesia.

4409. Wiersum, L. K.
Hevea aangetast door slijmziekte (*Pseudomonas solanacearum* Erw. Smith). **(Rubber infected with *P. solanacearum*.)** [English and Indonesian summaries 17 and 11 lines respectively.]
Bergcultures, 1955, **24**: 244-5, illus.

The symptoms are described of dieback of young hevea trees caused by *Pseudomonas solanacearum*. It is suggested that all diseased trees should be dug up, and the soil allowed to dry out thoroughly.

4410. Anon.
Termites.
Plant. Bull. R.R.I.M., 1955, No. 19, pp. 63-7, illus.

Coptotermes curvignathus, the rubber tree termite, is a serious problem only in new plantings where jungle growth remains. In the liquid method of control any mudwork on the trunk is first scraped down and 1-2 pints per tree of either Aldrex 2 emulsion at a concentration of 1 in 400, Dieldrex 15 at 1 in 300 or Indox 8 at 1 in 700 is poured round the base of the tree so as to run down by the taproot. The effect persists at least 2 years and the cost, about 1 c. per tree, is far below that of the classic treatment with 1% mercuric chloride. In the trail injection method white arsenic powder is blown into the mudwork trails on the trunks.

Sugar cane.

(*See also* 3419, 3859-3862, 3882, 4449b, d, h, n, p, r, y, 4450i, 4462, 4476, 4479, 4483.)

4411. Mauritius Sugar Industry Research Institute.
Annual Report of the Mauritius Sugar Industry Research Institute, 1954, 1955, pp. 86, illus.

This is the first technical report of the new Sugar Industry Research Institute and most of its research activities form the subject of abstracts presented below and in the section on Weed Control. There are also 14 appendices which include information on acreages, yields, production, sucrose analyses, variety trends, recent crosses and the variety collection at Réduit Experimental Station.

4412. George, L. V.
Sugar cane research at the Louisiana Agricultural Experiment Station.
Sugar J., 1955, **17** (10): 18-19, 22-4, illus.

Information is given on breeding under controlled temperature conditions [see also *H.A.*, 23: 4392 and 4393], control of ratoon stunting disease, weeds and *Diatraea* sp., variety trials, fertilization, deep tillage, spacing and economics.

4413. Stewart, C. W.
Experimental research at Audubon Sugar Factory.
Sugar J., 1955, **17** (10): 26-7, illus.

Research at this branch of the Louisiana State University includes milling tests on new varieties, and studies on the deterioration rate of cane between harvesting and milling and on the effect of dalapon herbicide on juices.

4414. Baver, L. D.
Radioisotopes: a versatile tool in sugar cane research.
Int. Sugar J., 1955, **57**: 127-30, illus.

Radioisotopes have been used in the following studies at the Experimental Station of the Hawaiian Sugar Planters' Association: photosynthesis, carbon metabolism and translocation, respiration, phosphorus fertilizer placement, phosphorus uptake and translocation, ammonium phosphate *vs.* superphosphate on phosphorus-deficient soils, nature and quantity of the phosphorus compounds in sugar cane, potassium nutrition (with the aid of rubidium 86), nitrogen nutrition, 2,4-D translocation, water distribution in irrigation, and sugar technology.

4415. Boa, W.
The application of field mechanization to sugar cane growing. Cane production methods in 1955.
Suppl. S. Afr. Sugar J., 1955, Vol. 39, No. 6, pp. 15, illus.

This report is based on an analysis of replies to a questionnaire returned by European growers and the milling companies. Every stage in the production of sugar cane is covered. Results and conclusions were: (1) The number of planting machines in use has fallen sharply since 1950. (2) Mechanical fertilizer distribution has also declined since 1950. (3) Since 1950 weeding by hand alone and by animals alone has decreased and weeding by tractors only and by tractors and animals has increased. (4) Most growers conserve trash, more than half of them on over 80% of their area. (5) 6% of the total area is irrigated compared with 1·38% in 1950. (6) Most growers are anxious to see a harvester developed. (7) For cane transport the motor lorry and the tramtruck are the commonest types of vehicle. Since 1950 wheel tractors have increased and lorries decreased. (8) It is considered that the first steps towards further mechanization in South Africa should be in field and siding loading and in weeding.

4416. de Sornay, A.
Cane breeding in 1953 and 1954.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 18-27, illus.

Promising varieties undergoing pre-release trials are M.311/41, M.129/43, M.147/44 and M.31/45. A study of the effect of environment on anther fertility in M.63/39 showed that: (1) the percentage of open anthers appears to be closely correlated with altitude and decreases at about 8% per 100 feet, reaching zero at about 1100 feet; (2) irrigation has no effect on anther fertility.

4417. KHAN, M. A., AND HALL, W. C.
Response of sugar-cane cuttings to auxin treatment as modified by other applied compounds.
Bot. Gaz., 1954, **116**: 172-83, bibl. 20, illus.

The use [on sugar cane cuttings] of sucrose or $KMnO_4$ singly did not significantly benefit germination, shoot growth or rooting, whereas the combined use of indoleacetic acid (IAA) with sucrose and of the amine salt of alpha-ortho-chlorophenoxypropionic acid (α-O-CPA) with $KMnO_4$ significantly increased germination and root weight and volume. A combination of IAA and α-O-CPA (9:1) stimulated rooting more than did IAA used singly. When this treatment was further followed by nitrogen additions to the rooting medium, a still further significant stimulation was observed. Thiamin chloride added to the rooting medium had little effect. Sucrose combined with the auxin-nitrogen treatment effected a significant decrease in all rooting responses. Cuttings made from the upper stalk were found to be responsive to added sucrose and those from the basal stalk to applied auxin; this suggests the necessity of a suitable auxin-sugar balance for optimum response. Cuttings from the middle stalk evidently had the most favorable balance for optimum normal response. Pre-exposure of cuttings to ethylene was antagonistic to subsequent auxin treatment in terms of rooting, although germination and shoot response were not significantly affected. Treatment of cuttings with auxins resulted in a decrease of reducing sugars and sucrose 24 hours after treatment. Reducing sugars decreased and sucrose increased from top to bottom of the stalk. The rate of respiration, as measured by carbon dioxide evolution, was accelerated by auxin treatment. Respiration was highest in the top portion of the stalk, and it decreased with distance from the stalk apex. The possible mechanism of action and the interaction of the various factors studied are discussed. [From authors' summary].—A. & M. Coll. Texas, College Station.

4418. BOURNE, B. A.
Studies on the treatments for improving the germination of sugarcane cuttings heat treated for ratoon stunt elimination.
Sugar J., 1955, **17** (10): 31, 33-6, bibl. 7.

In experiments by the U.S. Sugar Corporation at Clewiston, Florida, setts of 2 Cl. varieties, previously held in hot air at 50°C. for 24 hours or at 54°C. for 8 hours, received various chemical treatments to overcome the bud dormancy induced by the heat treatment. Certain oxidizing agents improved germination. Soaking in sodium peroxide at a 0·2% aqueous concentration for 24 hours after the heat treatment gave the best results. It doubled the germination percentage after 13 days and gave a mean shoot height after 25 days 169% greater than in the controls.

4419. PAO, T. P., AND HO, F. W.
Field experiments on the interplanting of autumn and spring planted cane with leguminous green manure crops. [Chinese, with English summary 1½ pp.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 11, pp. 7-40, bibl. 12.

Spring- and autumn-planted cane was interplanted with *Crotalaria juncea*, *Mucuna capitata*, *Sesbania sesban* and *Vigna sinensis* and was dressed with 0, 80, 130 and 240 kg. N per ha. plus ample P and K. *Crotalaria* increased sugar yield by 14 and 6% and numbers of millable cane stalks per unit area by 8 and 4% in spring and autumn plantings respectively and slightly increased average weight per stalk. 160 lb. N gave the highest sugar yields, 111 and 48% more than the controls in spring- and autumn-planted cane respectively. It is estimated that by interplanting with *Crotalaria* the N fertilizer rate can be reduced by 30-60 kg. per ha. The other legumes had no effect on the cane.

4420. HALAIS, P.
Nutrition and soils. 5. Foliar diagnosis.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 42-6.

A differential method has been developed for the determination of N which minimizes the effect of variety, age (provided the cane is still young), category (plant or ratoon), and weather preceding sampling. Groups of 3 micro-plots are established, consisting of a plus-N plot receiving an extra 20 kg. N per arpent flanked by 2 standard-N plots. Leaf blades are sampled from each plot 2-3 times during the 2nd and 3rd month after applying the extra N to the plus-N plot. The average increase in N in the leaf-punch of the plus-N plot over the standard-N plots is determined and the corresponding relative increase in sugar production following the addition of extra N is then calculated from data available. If the extra N gives no increase in calculated sugar production the standard fertilization may have been excessive and is gradually decreased, while differential foliar diagnosis is continued, until the N requirements of the area in question have been accurately evaluated. Methods of sampling, wet digestion, and analysis for N, P and K are briefly described.

4421. SAMUELS, G.
The application of foliar diagnosis procedures to commercial sugarcane practices in Puerto Rico.
Sugar J., 1955, **17** (12): 57-62.

An account is given of the method of sampling and of the use of foliar diagnosis in detecting deficiencies, excesses or improper balance between fertilizers and such other factors as poor drainage or low pH.

4422. ROUILLARD, G.
Nutrition and soils. 4. Organic fertilizers.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 37-42.

In experiments on M.134/32 laid down by the Centre Agronomique du Nord in 1947 and 1948 F.Y.M. and factory scums applied at 10 tons per arpent on planting (in addition to annual inorganic nitrogen dressings) gave no significant response in normally fertile soils, but gave large, significant increases in cane and sugar yields on eroded soils deficient in phosphate and potash, scums giving better yields than the same weight of F.Y.M. Where K deficiency was not a limiting factor molasses gave a slight but insignificant ratoon yield increase provided N was adequate. The application of molasses at 10 tons per arpent in the furrow is recommended where K is deficient.

4423. Vallance, L. G.
Farm fertilizer trials. Results of the 1954 season.
Molasses–mill mud–minor element trial.
Cane Grs' quart. Bull., 1955, **18:** 108-13 and 113.

The main part of this report consists of notes on NPK and lime trials on various farms. In 1952/54 a molasses–mill mud–minor element trial was laid down in the Mackay district on a clay soil liable to set hard in dry weather and to become waterlogged in the rainy season. The elements used were Cu, Zn, Mo, B, Mn, Co, S and Ca. Only molasses increased yields, giving 18·7 tons per acre compared with 14·0 in untreated control plots, and this was attributed to improvement in the physical condition of the soil.

4424. Murakumo, K., Lee, F. V., and Lai, T. M.
Absorption of mineral nutrients and accumulation of sugars by sugarcane plants at successive stages of growth. [Chinese, with English summary 1¾ pp.]
Rep. Taiwan Sugar Exp. Stat., 1953, No. 11, pp. 41-63, bibl. 15.

A study was made of the absorption of N, P, K, Ca, Mg and Si and of accumulation of sugars in the aerial parts of P.O.J. 2725. The results showed that: (1) Sucrose accumulation was rapid between the 9th month and maturity, reaching a maximum in the 16th month. Fibre accumulation was slower. The content of reducing sugars was higher than that of sucrose at the period of the most rapid growth. (2) The N content reached its highest point about the 9th month and then gradually decreased until it was lower than that of Ca at maturity. K absorption was very rapid about the 10th month. Si content was very high in the dry leaf but varied from year to year. Ca and Mg were absorbed at a similar rate but Ca was usually more abundant in the leaves than in the stalks, whereas the reverse was true of Mg. (3) The dry matter of dry leaves had much lower concentrations of N, P and K, a somewhat lower concentration of Mg and higher concentrations of Si and Ca than that of green leaves; it is concluded that some elements are translocated before the leaves become physiologically inactive, whereas others are not. (4) The amounts of minerals removed by a crop of P.O.J. 2725 measured at the time of maximum sucrose accumulation in 3 successive years were, in kg. per ha., 126-165 N, 78-94 P_2O_5, 233-276 K_2O, 172-181 CaO, 139-168 MgO and 325-664 SiO_2. (5) The vegetative growth stage, as determined by various physiological phenomena, was found to last 10 months or 62·5% of the growth period. (6) Cultural practices are discussed.

4425. Feillafé, S. M.
Nutrition and soils. 1. Nitrogen.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 28-30.

The main effect of N fertilization in Mauritius is a large yield increase. Other conclusions from past research are: (1) N gives a greater yield response in sub-humid than in the humid or super-humid zones; (2) pen manure applied after normal N fertilization with artificials has no effect; (3) N slightly reduces sugar content, especially in plant cane, but the reduction is more than offset by the increased cane yield; (4) sugar yield in ratoons can be maintained by increasing N fertilization.

4426. Feillafé, S. M.
Nutrition and soils. 2. Phosphate and potash deficiencies.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 31-2, illus.

In a trial started at Reduit Experimental Station in 1936 the no-phosphate plots gave 78, 79, 75 and 85% of the yields of the NPK plots in 1937/39, 1940/43, 1944/50 and 1951/54 respectively. Corresponding figures for the no-potash plots were 81, 79, 65 and 46%.

4427. Feillafé, S. M.
Nutrition and soils. 3. Preliminary results of liming soils of the super-humid zone.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 33-7,

In experiments laid down in 1948 and 1950 Ca gave a highly significant cane yield increase on a gravelly clay. Ca and Mg increased leaf CaO and MgO on the gravelly, and on a boulder, clay. Ca slightly reduced sugar contents on both soil types, but on the gravelly clay this was more than offset by the increase in cane yield.

4428. Burleigh, C. H.
Results of two years of crop logging at Aguirre.
Sugar J., 1955, **17** (12): 46, 48, 50.

Control of irrigation by crop logging during ripening began in 1952. In the 1953 and 1954 crops irrigation costs were considerably lower than normal as logging showed that over-irrigation was occurring in many cases, and the crop-logged fields, harvested at the desired 74% sheath moisture, gave a greater tonnage per acre than normally treated fields. Control of fertilization by crop logging is to begin.

4429. Wiehe, P. O.
Diseases. 2. Chlorotic streak.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 48-50.

In hot-water-treated (52°C. for 20 minutes) setts of Ebène 1/37 germination was 86% compared with 48% in diseased controls, shoots dying from chlorotic streak during the first 5 months amounted to 8% compared with 41%, shoots showing leaf symptoms were 3% compared with 40%, and the total lengths of shoots in cm. after 5 months were 5623 cm. compared with 1904. Cane number, stalk length and diameter, and stool weight were all significantly greater in symptomless than in diseased stools of M.134/32, but sucrose content was not significantly different. Stool weight was reduced by more than 30% in diseased stools.

4430. Wiehe, P. O.
Diseases. 1. Ratoon stunting disease.
A.R. Mauritius Sugar Ind. Res. Inst. 1954, 1955, pp. 47-8.

Germination of the setts of 10 varieties subjected to hot-water treatment at 50°C. for 2 hours, expressed as a percentage of the germination of untreated controls, ranged from 27% in B.34104 to just over 90% in M.112/34.

4431. Abbott, E. V.
Red rot of sugar cane.
Aust. Sugar J., 1955, **46:** 669, 671-2, 677.

In the U.S.A. commercial varieties resistant to red rot (*Physalospora tucumanensis*) are C.P.36/105, C.P.44/101, C.P.44/155 and C.P.36/111. In Louisiana red rot injury can largely be avoided by planting in August when conditions favour early germination and rapid establishment.—U.S. Sugar Plant Field Stat., Houma, La.

4432. Anon.
Trassen en stengelboorderaantasting. (**Trash stripping and borer attacks.**)
Maandber. Proefst. Java-Suikerindustr., 1955, No. 3, pp. 44-7, from abstr. in *Trop. Abstr.*, 1955, **10,** No. c 1782.

In a preliminary trial in Java stripping trash reduced borer attacks to 70% of those occurring in untrashed plots. However, the practicability of the method is doubted, and it is also thought possible that the removal of some of the leaves while still green might adversely affect sugar yields.

4433. Reid, H. E.
Chain usage in sugar cane harvesting.
Sugar N. York, 1955, **50** (4): 36-8, illus.

The construction of cane slings and their use in the transport of cane from field to mill is described. Rings or special links at the end of the body chain are provided for binding and lifting. A stop ring is generally coupled into the body chain at some point to prevent bundling stresses from becoming too great and prematurely crushing the sugar cane. A quick release hook mechanism, known as a grip-trip, is threaded on to the body chain before the section containing the lifting ring or link is coupled into the stop ring. The grip-trip moves freely along the chain between the lifting and stop rings. In some areas, chain nets, often 15 to 20 feet square and with 1 foot square mesh, are used instead of slings.—Tech. Serv. Div., McKay Co.

4434. Serbia, G. R., and Hernandez Fragoso, J.
New, accurate method for preparing samples of cane for analysis.
Sugar N. York, 1955, **50** (5): 39.

A description is given of a method in which the cane is sawn transversely to provide the sample. It is said to give more accurate analytical results, especially for fibre content, than the method by which cane is split lengthwise [*H.A.*, 24: 2079l].—Central Aguirre Sugar Co.

4435. Wiggins, L. F., and Williams, J. H.
Amino-acid content of West Indies sugar cane.
J. agric. Food Chem., 1955, **3:** 341-5, bibl. 8.

Using chromatographic techniques the presence of 11 amino acids was demonstrated in sugar cane juice. Their distribution in the cane stalk and their quantitative variation with age of plant and climatic conditions were examined. Different cane varieties had essentially the same amino acid picture, though there were quantitative differences. Cane leaves contained the same amino acids as the juice, but most of their N was in protein form. Under normal conditions the amino acid content of the cane juice decreased with age, but under drought conditions there was a marked increase in amino acid content.—Imp. Coll. trop. Agric., Trinidad.

4436. Drake, J., Wiggins, L. F., and Wise, W. S.
The aconitic acid content of British West Indian molasses.
Int. Sugar J., 1955, **57:** 160-2, bibl. 9.

Aconitic acid, potentially useful in the plastics industry, was established polarographically in molasses samples from various British West Indian colonies and found to be present in smaller quantities than in Louisiana molasses. It is considered unlikely that extraction would be an economic proposition.—Dep. Sugar Chem. Technol., I.C.T.A., Trinidad.

Tea.

(*See also* 4449f, 4450d, l, m.)

4437. Walter, T. E.
Future prospects in the low country.
Tea Quart., 1955, **26:** 40-8.

The yields of the more outstanding low-country clones under trial are given. These include the 1951 series clone 106, which gives a calculated yield of 2898 lb. per acre and is free from blister blight. In some areas dieback, possibly due to shothole borer, is severe between 18 and 24 months from pruning. In investigations on dieback at Ingiriya pruning cycles of 1½ 2, 2½ and 3 years were compared. At the end of 2½ years the 18-months cycle had given a total yield 130 lb. per acre greater than any of the others and was increasing its lead. Results to date suggest that, where dieback associated with shothole borer occurs, an 18-month pruning cycle should be considered and that elsewhere a 30- or 36-month cycle is satisfactory.

4438. Rose, E. S.
Practical aspects of replanting.
Tea Quart., 1955, **26:** 49-55.

The operations of cleaning, drainage, contour trenching, cover cropping, planting and bringing into bearing after 2 years are discussed, together with itemized details of costs.

4439. Laoh, J. P.
Fungicidenproeven bij blisterblight (*Exobasidium vexans*) op thee. (**Fungicide trials for blister blight on tea.**) [English and Indonesian summaries 1p. and 6 lines respectively.]
Arch. Theecult., 1955, **19:** 2-9, bibl. 2.

Fungicidal sprays were applied weekly to tea bushes between mid-October and the beginning of April. The results showed that copper oxychloride was more effective than either phenyl mercury acetate or Combacide (3,5-dimethyl tetrahydro-1,3,5,2-thiadizine 2-thion) in control of blister blight. Of the fungicidal dusts applied during the same period at weekly intervals, copper oxychloride also gave the best control. Bulbosit (based on nirit) gave satisfactory control but is rather expensive. Powdered bark of *Acacia decurrens* gave some control but may taint the tea.

4440. Laoh, J. P.
Enkele resultaten ven het blisterblight onderzoek in West-Java. (**Some results of blister blight research in West Java.**) [English and Indonesian summaries 1 p. each.]
Arch. Theecult., 1955, **19:** 11-35, bibl. 10.

Positive results were obtained in the control of blister blight on tea by dusting with technical copper oxychloride or Shell Copper Fungicide 2% Cu at 5-day intervals. With heavy infections yields from treated plots were increased by 20% over an area of up to 85 m. from the spraying alley. The average copper deposit at 70 m. from the spraying alley was 50 g./ha.

4441. Loos, C. A.
Eelworms.
Tea Quart., 1955, **26:** 27-8.

Control of the meadow eelworm is discussed under 3 headings: (1) in nurseries by fumigation; (2) in replanting areas and new clearings by fallowing for one year, if possible with clean weeding, and then cropping for a year with a non-susceptible crop such as Guatemala grass, *Desmodium gyroides*, *Crotalaria usaramoensis* or *C. anagyroides*; and (3) by the selection and propagation of tolerant material. For example, T.R.I. clone 2024 is tolerant whereas T.R.I. 1294 is susceptible.

4442. Todd, J. R.
Colorimetric methods for studying the fermentation process in black tea manufacture.
Chem. Ind. Lond., 1955, No. 25, pp. 704-5, bibl. 7.

Preliminary studies suggest that ultra-violet absorption at 205 mμ may prove a convenient and rapid method of estimating the polyphenols in extracts from green or fermenting tea leaf. Colour development in fermenting leaf has also been found to be quantitatively linked with changes in the polyphenol content of the leaf.—Tea Res. Inst. E. Afr., Kericho, Kenya.

4443. Johnson, R. M., and Raymond, W. D.
Tea from Mauritius.
Colon. Plant Anim. Prod., 1955, **5:** 51-7.

Samples of Mauritius tea were examined by tea brokers and merchants in the United Kingdom and were considered to be of good quality and able to fulfil market requirements.

Sundry crops.

(*See also* 4449k, 4450b, c, h, k.)

4444. Harrington, F. B.
Cherimoya.
Fmrs' Wkly S. Afr., 13 July, 1955, pp. 58-9, 61, illus.

A popular account is given of the cherimoya (*Annona cherimola*) in South Africa. Among the main points discussed are pollination, rootstocks, soils, varieties and interspecific hybrids. Reference is made to the use of the wild Transvaal custard apple, *A. senegalensis*, as a pollinator to improve fruit set in cherimoyas.

4445. Hassall, C. H., and Reyle, K.
Hypoglycin A and B, two biologically active polypeptides from *Blighia sapida*.
Biochem. J., 1955, **69:** 334-9, bibl. 25.

A toxin in the fruit of *Blighia sapida* [the akee] has for long been suspected as the cause of "vomiting sickness" in Jamaica. Data are presented on the isolation from the unripe seeds of 2 peptides which proved toxic to test animals. One of these peptides, hypoglycin A, also occurs in the edible arillus, the concentration being particularly high when the arillus is unripe.—Chem. Dep., Univ. Coll. W. Indies, Jamaica.

4446. Mustard, M. J.
Pollen production and seed development in the white sapote.
Bot. Gaz., 1954, **116:** 189-92, bibl. 11, illus.

A study was made of the comparative availability of pollen produced by the Dade variety of white sapote (*Casimiroa edulis*) and other varieties and seedlings, in an attempt to determine the factors responsible for faulty seed formation and subsequent shedding of most of the fruit in a plantation of Dade. All the flowers of all the varieties studied were structurally hermaphroditic. The anthers in the Dade and Blumenthal varieties, however, differed markedly in appearance from those of the others and contained no normal pollen grains. The other varieties and seedlings were found to produce an abundance of spheroidal pollen grains containing 3 germ pores. It is concluded that total or partial pollen-sterility may be a factor responsible for the failure to set fruit.

4447. Tixier, P.
Contribution à l'étude des *Garcinia*. **(Contribution to the study of the *Garcinias*.)**
Fruits d'Outre Mer, 1955, **10:** 209-12, illus.

Notes on 6 types, including the mangosteen (*G. mangostana*) and the gamboge (*G. hanburyi*), concern seed morphology and anatomy, period of viability, water relations during germination, and bi-polar germination (shoots arising near the radicle and also from a zone on the upper surface). The cytology of *G. mangostana* is also discussed.

4448. Russell, T. A.
The kola of Nigeria and the Cameroons.
Trop. Agriculture Trin., 1955, **32:** 210-40, bibl. 76.
The kola nut of West Africa.
World Crops, 1955, **7:** 221-5, illus.

An account is given of the known history of kola nuts and their recognition as the seed of several species of *Cola*. Four species and three varieties of *Cola* with edible seed have been distinguished in Nigeria and the British Cameroons, and are here described along with their distribution and uses. A key is provided enabling the species to be separated. A description is given of the farmer's cultivation of *C. nitida* in Nigeria and suggestions made for improving his practice. The yield to be expected from a planting of *C. nitida* is discussed and attention drawn to wide differences in performances of individual trees. The possibility thereby offered of greatly increasing yields by the careful selection and propagation of high-yielding trees is stressed. A study of the causes of low fruit production indicates that pollination is often ineffective. The presence of some form of incompatibility is suspected. There is frequently heavy loss of young fruit from a cause not yet known. Wounding of the bark of tree-trunks resulted in a significantly increased yield of mature fruits. [From author's summary in first paper.] The second paper covers the same ground more briefly.—Dep. Agric., Nigeria.

Noted.

4449.

a Adriaens, E. L.
Généralités sur les carotènes. **(General remarks on carotenes.)** [Flemish summary ½ p.]
Bull. agric. Congo belge, 1955, **46:** 559-66, bibl. 9.
A summary of information referred to in *H.A.*, 25: 3305.

b Agete Piñeyro, F.
Variedades de caña en Alto Cedro. **(Cane varieties in Alto Cedro.)**
Mem. XXVII Conf. an. Asoc. Téc. azuc. Cuba 1953, pp. 31-4.

c Anon.
Normas para el cultivo del cacao. **(Advisory notes on cacao growing.)**
Cacao en Colomb., 1953, **2:** 183-5, and 1954, **3:** 213-17.
For the first instalment of these notes see *H.A.*, 24: 3121.

d Anon.
Hurrycane harvesting system now adapted to the tropics.
Sugar J., 1955, **17** (12): 63-4, illus.
The new Thomson crawler-mounted harvester.

e Anon.
The persistence of aldrin and dieldrin in the bark of coffee trees.
Progr. Rep. Colon. Insecticide Res., 1955, No. 16, pp. 16-17.
Less persistent than DDT.

f Anon.
The Tocklai withering tunnel.
Two and a Bud, 1955, **2** (1): 15-19.
Capacities of tunnels and timing of operations.

g Barnet, G. W. D.
A guide to the cost of replanting rubber.
Adv. Circ. Rubb. Res. Inst. Ceylon, **52,** 1954, pp. 4.
Costs up to the 7th year.

h Barreto, R.
Plan experimental con nuevas variedades realizado por la estación experimental de la caña de azúcar de Jovellanos. **(Experimental plan with new varieties bred at the Jovellanos Sugar Cane Experimental Station.)**
Mem. XXVII Conf. an. Asoc. Téc. azuc. Cuba 1953, pp. 28-30.

i Berrill, F. W.
Dwarf and semi-dwarf varieties of banana.
Qd agric. J., 1955, **80:** 83-7, illus.
Notes on Cavendish, Mons Mari, William's Hybrid and Lacatan.

j Bertin-Roulleau, J.
Le cacao en Côte d'Ivoire. **(Cacao growing in the Ivory Coast.)**
Gordian, 1955, **54** (1305): 86-9, (1308): 13-15,
Production, research and marketing.

k Bodard, M.
Note sur quelques kolatiers africains. (II). **(Note on some African kolas. II.)**
J. Agric. trop. Bot. appl., 1955, **2:** 50-63, bibl. 14, illus.
Botanical descriptions of several *Cola* spp.

l Boynton, D., and Erickson, A.
A response of seedling cacao trees, under nursery conditions, to magnesium and calcium.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 15-20, bibl. 5, illus.
See *H.A.*, 25: 2132.

m Buelvas Cabrales, R. A.
Un arbol de cacao con frutos partenocárpicos en en Valle de Cauca. **(A cacao tree with parthenocarpic fruits in the Cauca valley.)** [English summary ¾ p.]
Cacao en Colomb., 1954, **3:** 93-105, bibl. 9, illus.

n Chirinos Peña, J. T.
La agricultura en Barquisimeto. **(Agriculture in Barquisimeto [Venezuela].)**
Agric. venezol., 1955, **19** (176): 20-3, illus.
Brief notes on sugar cane and sisal growing.

o Ewart, K.
Report on mechanization of agricultural crops in New Guinea.
Papua N. Guinea agric. J., 1954, **9:** 75-87, illus.
In coconut plantations [see also *H.A.*, 25: 3369s].

p Fors, A. L.
El uso de la *Canavalia ensiformis* L. como modificador de suelos en campos de caña. **(The use of *Canavalia ensiformis* as a soil improver in cane fields.)**
Mem. XXVII Conf. An. Asoc. Téc. azuc. Cuba 1953, pp. 67-72, illus.
For rehabilitating exhausted soils.

q García Becerra, C.
La situación cacaotera en Colombia. **(The position of the cacao industry in Colombia.)**
Cacao en Colomb., 1954, **3:** 1-9.

r Grassi, U.
La coltivazione della canna da zucchero in Egitto. **(Sugar cane growing in Egypt.)**
Riv. Agric. subtrop., 1955, **49:** 149-52.
Distribution, acreage, varieties and cultural practices including irrigation.

s Haarer, A. E.
Shade or no shade for Arabian coffee.
World Crops, 1955, **7:** 271-3, bibl. 9, illus.
Density required, soil cover, shade tree species.

t Hamilton, R. A.
Growth studies of papaya plants on a tropical soil with a compacted subsoil.
Proc. Amer. Soc. hort. Sci., 1954, **64:** 111-16, bibl. 6, illus.
For a shorter version see *H.A.*, 24: 2009.

u Hilton, R. N.
South American leaf blight. A review of the literature relating to its depredations in South America, its threat to the Far East, and the methods available for its control.
J. Rubb. Res. Inst. Malaya, 1955, **14:** 287-354, bibl. 105, maps.
Dothidella ulei.

v Jacques-Félix, H.
Note sur le bananier séminifère de l'Ouest africain. (**Note on the seeded banana of West Africa.**)
J. Agric. trop. Bot. appl., 1955, **2:** 94-6, bibl. 2, illus.
Ensete gilletii—distribution, biology and genetics.

w Koch. J., and Wirth, —.
Über die Ergiebigkeit der Kakaokerne. (**On the composition of cacao beans.**)
Gordian, 1955, **54** (1307): 13-15, (1310): 13.
With special reference to cacao fat.

x Laíns e Silva, H.
Timore e a cultura do café. (**Coffee growing in Timor.**)
Rev. Café portug., 1955, **2** (5): 13-26.
Climate, types and distribution.

y Lizárraga Goñi, J.
Experiencias sobre la variedad de caña Pepe Cuca. (**Tests on the cane variety Pepe Cuca.**)
Mem. XXVII Conf. an. Asoc. Téc. azuc. Cuba 1953, pp. 35-43.
Yields and analyses.

z Machado S., A.
Pronóstico de las cosechas del cafeto. Algunos aspectos de los primeros trabajos exploratorios. (**Forcasting coffee harvests. Some aspects of the first exploratory experiments.**
Rev. Fac. nac. Agron. Colombia, 1955, **16** (47): 67-93, bibl. 15, illus.
H.A., 23: 2266 relates to a summary of this paper.

4450.

a van der Meulen, A., and Impey, R. L.
Should coffee be grown in the Union?
Fmg S. Afr., 1955, **30:** 279-80, 282, bibl. 7, illus.
No definite answer is possible until trials have been made.

b Nield, J.
The harvesting, handling and packing of pineapples for export.
Agric. J. Dep. Agric. Fiji, 1955, **26:** 16-18, illus.
Including notes on undesirable fruit characters and optimum state of maturity.

c Pélegrin, P.
Tracteurs enjambeurs pour ananas. (**Straddle tractors for pineapples.**)
Fruits d'Outre Mer, 1955, **10:** 237-43, illus.
Eight models briefly described.

d Portsmouth, G. B.
The expansion of Ceylon tea production. The prospects for replanting and new planting.
Tea Quart., 1955, **26:** 10-15.
Including yield data on promising new clones.

e Pronk, F.
Vergelijkend trosanalytisch onderzoek van enkele typen van de oliepalm (*Elaeis guineensis* Jacq.). (**Comparative bunch analysis of oil palm types.**) [English and Indonesian summaries 8 and 10 lines respectively.]
Bergcultures, 1955, **24:** 323-9.
Further analyses have confirmed previous results [*H.A.*, 24: 2004].

f Risdon, E. J.
Prevention of coagulation in the field.
Adv. Circ. Rubb. Res. Inst. Ceylon **53,** 1955, pp. 4 (superseding 2nd Suppl. to *Adv. Circ.* **17**).
Choice of, and method of applying, anticoagulants.

g Salgado, M. L. M.
Soil management on coconut estates.
Ceylon Coconut Quart., 1954, **5:** 153-8, illus.
Cultivation, mulching, trash burning, drainage, claying, weeding.

h Siddappa, G. S., and Bhatia, B. S.
Preservation of mangosteen. *Garcinia mangostana.*
Bull. centr. Food tech. Res. Inst. Mysore, 1954, **3:** 296-7, from abstr. in *Fruits d'Outre Mer*, 1955, **10** (6), *Suppl. Fruits trop. subtrop.*, No. 12-10496.
Composition, uses for canning and as syrup, juice and jelly.

i Simmonds, F. J.
Establishment of parasites of *Diatraea saccharalis* F. in Dominica (British West Indies) and Guadeloupe (French West Indies).
Trop. Agriculture Trin., 1955, **32:** 198-200, bibl. 2.
Paratheresia claripalpis and *Lixophaga diatraeae.*

j Spoon, W.
Voederwaarde van Surinaamse palmkernkoeken. (**The nutritive value of Surinam palm kernel cakes.**) [English summary 1 p.]
Oliën. Vetten en Zeep, 1955, **39** (2): 15, reprinted as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **249,** 1955, pp. 8, bibl. 7.
Astrocaryum segregatum, A. schiophilum and *A. paramaca.*

k SPOON, W.
Cashew-noten. **(Cashew nuts.)** [English summary 1¼ pp.]
Meded. Afrika-Inst., 1955, **9:** 109, reprinted as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **250,** 1955, pp. 8, bibl 13, illlus.
Production in India and East Africa.

l TRINICK, J. M.
The examination and tasting of tea.
Two and a Bud, 1955, **2** (1): 1-14.

m VAN WIJK, J.
Epicyclische rolling met de snijconus. **(Epicyclic rolling with a cutting cone.)** [English and Indonesian summaries 4 lines each.]
Bergcultures, 1955, **24:** 305-7, illus.
An improved type of the cone described earlier [*H.A.*, 25: 3370s].

NOTES ON BOOKS AND REPORTS.

Books.

4451. CHRISTOPHER, E. P.
The pruning manual.
Macmillan Company, New York and London, 1954, 8×5½ in., pp. 320, illus. $5 or 35s.

This book is based largely upon The Pruning Manual of Dr. Liberty Hyde Bailey. Bailey first published his book in 1898 and it has been repeatedly revised and reprinted. The present manual has been compiled afresh and comprises nineteen chapters and a foreword by Bailey himself. It covers the pruning of a wide range of horticultural plants, fruit trees, bush fruits, vines, shrubs, roses, hedge plants, forest trees, shade and ornamental trees including Christmas trees. A chapter on grafting defines the terms and techniques employed in making seven different grafts used in the repair of trees or for the bracing of branches. There is much useful information in the chapter dealing with pruning in relation to nursery practice. Mr. Christopher is to be congratulated on condensing into the first three chapters much fundamental knowledge and recent research on the behaviour of plants in relation to pruning and on succeeding in making the book one of easy reference for the horticulturist. A.P.P.

4452. DEUTSCHE KALIWERKE G.M.B.H.
Kali im Bild. **(Potash in pictures.)** [In German, English, French, Spanish, Italian.]
Verkaufsgemeinschaft Deutscher Kaliwerke G.m.b.H., Hanover, 1955, 45 plates [each 8½×6 in.].

The photographs in this folder, with captions in five languages, illustrate the effects of potassium manuring and the symptoms of potassium deficiency in the more important temperate and tropical crops, including many vegetable, fruit and plantation crops. The collection will be supplemented from time to time.

4453. EUROPA PUBLICATIONS LIMITED.
The world of learning 1955.
Europa Publications, Bloomsbury St., London, W.C., 1955, 6th edition, 10×8 in., pp. 1026, £5.

The present work is prefaced by a concise useful report on the work of UNESCO. This is followed by a list of the chief international scientific educational and cultural organizations and a brief statement of their objects.

The main part of the book affords detailed information on the sources of learning throughout the world in so far as the editors have managed to extract it from those concerned.

This compilation is year by year becoming more useful as the various nations, until recently disturbed by wars and the rumours thereof, settle down into the comparatively peaceful pursuit of knowledge. Thus, while it is still somewhat obvious from the wealth of detail given that Princeton University, N.J., for instance, is much more anxious to have the foreign student meet his opposite number at Princeton than is the Rector of the Lvov Veterinary Institute in the Ukrainian S.S.R., it will at least be seen that the list of research institutes in the U.S.S.R. and associated countries is a formidable and growing one.

This is a book which should be at every librarian's elbow and should enable him to initiate many innocent penpalships between the erudite of distant lands.

Ultimately the fulness of the information depends, of course, on us and how adequately we fill up questionnaires. The compilers can go, and have gone, far. The Republic of China in Formosa and the People's Republic of China are both briefly represented. A determined effort is being made at present to bring the information on Indian Universities up to date. It is up to us to help the compilers—and finally ourselves—with the necessary information. D.A.

4454. HAWTHORN, L. R., AND POLLARD, L. H.
Vegetable and flower seed production.
Blakiston Co., Inc., New York and Toronto, 1954, 9½×6 in., pp. 626, bibls., illus., 56s. 6d.

With the exception of the Eastern Counties, climatic conditions in Great Britain are more generally suited to vegetative growth than to the production of good quality mature seeds. The comparative mildness of our climate makes possible the cultivation of many vegetables, particularly brassicas, through the winter, and these are the crops which, flowering in the spring, can be seeded most successfully. Seed production of the summer vegetables is prejudiced by the tendency to cool, damp weather in the autumn. Thus it is that we produce most of our seed of brassica crops and largely import that of lettuce, peas and beans.

Nevertheless, seed production of both vegetables and flowers is an important industry in this country; it is also to a large extent a specialist industry, since for most of the vegetables (and all the flowers) seed production is not coincidental with production for market, as it is with cereals. This specialized work is largely in the capable hands of the seed trade, to whose efforts and long experience we owe the generally high standard of our vegetable varieties. At the same time, there are very many small growers who prefer to save their own seed, because they rightly consider that by so doing they will develop a strain more nearly suited to their own environments. To both types of seed producer—in fact to anyone who is interested in seed production, whether seed merchant or seed grower, amateur or professional gardener, plant breeder or research worker—there is something of value in this book. True, it deals with the American seed industry, which is more highly mechanized than its British counterpart, but that merely means that the British reader gets more information than he can at present use; it also means that he gets the benefit of American experience.

The book is in four parts. The first deals with seed production historically, in relation to environmental conditions and also to plant breeding; here the whole field is surveyed. The second part, and the largest, deals with individual vegetable crops, grouped in botanical families. The arrangement is sound, since the methods employed in growing for market, and even more so for seed, are often similar for plants belonging to the same family. For each crop consideration is given to climatic and soil requirements, plant characters, methods of production (whether root-to-seed or seed-to-seed), cultural practices (including fertilizers, irrigation, weed control and isolation), the application of research to seed production (spacing, soil moisture, steckling size, effect of temperature and photoperiod), harvesting and milling, breeding, diseases and pests. The amount of detail varies naturally with the importance of the crop in America, so that brussels sprouts are summarily dismissed as a minor crop, whereas the cucurbitaceous crops and sweet corn each have a chapter; however, brussels sprouts is the only crop of importance here to be so neglected. Potatoes are not included since they are not propagated by seed except in breeding work.

Part three deals with flower seed crops and has three chapters only, of which the first is general and the others deal respectively with annual flowers and perennials and biennials. Again, the arrangement is sound, because although there are more kinds of flowers than of vegetables, they belong to many more families and very much less has been published about them, particularly on the effect of environmental conditions.

Lastly, part four deals with the matured seed, and includes chapters on harvesting and milling equipment, seed storage and handling and marketing.

References to literature, which are plentiful and up to 1953, are listed at the end of each chapter. The authors admit that a full coverage of non-American studies was not made. This perhaps explains why there is no mention of the very useful Seed Growers' Leaflets issued by the National Institute of Agricultural Botany. Errors are few and are mostly in scientific names, particularly in the chapter on cole crops of the Cruciferae. There is a woolly paragraph on pollination in the Brassicae on p. 337 which seems to ignore the effects of incompatibility, though the subject is discussed in detail on pp. 350-353. Finally, the authors state in the preface that the book "is an outgrowth of material used in a course on the production of vegetable and flower seeds". In this country the business of seed production has to be learned the hard way! J.C.H.

4455. INTERNATIONAL POTASH INSTITUTE.
Potassium symposium 1954.
International Potash Institute, Bern, 1955, 9×6 in., pp. 445, illus.

Twenty papers read at the Annual Meeting of the Institute, mainly in German or English, with German, French, Spanish and English summaries are reproduced here.

Some five papers each are devoted to problems which particularly concern potassium in the soil, potassium in the plant, use of potassium in agriculture, and potassium analyses. Recent research findings on all these problems are usefully summarized. Subject indexes are given in 4 languages.

D.A.

4456. JACKS, G. V.
Multilingual vocabulary of soil science.
F.A.O., Rome, 1955, 9×5 in., pp. 439, $4.00 or 20s.

The languages covered are English, French, German, Spanish, Portuguese, Italian, Dutch and Swedish. Intelligent indexing and arrangement of text makes them all equally available.

4457. LEOPOLD, A. C.
Auxins and plant growth.
University of California Press, Berkeley and Los Angeles, 1955, 9½×6 in., pp. xi+354, bibls, illus., 37s. 6d.

The latest recruit in the platoon of books about plant hormones will prove a worthy campaigner. It is the product of a lively mind engaged at close experimental quarters and still in the heat of battle. Accordingly, having the immediacy of the front line despatch, it is rather hurried for the more general tactical appraisal. To be explicit the second half of Dr. Leopold's book, which traverses the familiar ground of the practical uses of synthetic growth regulating substances in agriculture, does not obviously escape from the restricted "consolidations of already known phenomena" into a boundless field of new discovery. Often the problem is not to provide a physiological explanation for given behaviour, but to unravel the complexity of factor interplay, to which the author in his final chapter assents. By emphasizing the underlying physiological principles the tendency is to oversimplify with inadequate recognition of the degree of any given effect.

But to begin at the beginning, congratulations to the author on his title which pays long overdue tribute to the role of auxin in regulating growth. Yet we cross swords when he insists on rigid distinction between the indigenous hormone and the synthetic compound with similar powers. Surely, when the latter "exploits the same mechanisms" in the plant it is functioning in the same way, and what once seemed complete divorce between the physiological study of auxin and the chemical investigation of laboratory-made substances has been harmonized with the advent of chromatographical techniques and the separation and recognition of a range of natural active preparations. Furthermore strict adherence to the original definition of hormone would mean that a natural substance extracted and applied to another plant would, under such circumstances, no longer be hormonal.

Such comment is not, however, meant to belittle the value of a lucid presentation of the auxin story by a plant physiologist concerned to ensure that fundamental knowledge is allowed its full sway. In acquiring such knowledge concept and theory are the stepping stones, and the measure of success of the book is really the facility with which the reader is disposed to join in the discussions. The opening chapter sketches the history of auxin with formal discarding of auxins a and b. Then come descriptions of auxin extraction and assay methods, with an encouraging injunction to use them! Chapter 3 considers the occurrence of auxin in the plant, its correlation with growth, its status, formation, movement and inactivation, and is followed by a chapter on its developmental effects with emphasis on the dualism of its action, stimulating or inhibiting according to concentration. Passing from the internal effects of endogenous auxin the author examines the various physiological and anatomical effects of an exogenous supply of synthetic auxin and then discusses the factors influencing the effectiveness of auxin application. This leads to consideration of chemical structure of growth regulating compounds with a climax chapter on the theories of auxin action, not omitting enzyme kinetics.

Altogether this is a most readable book, attractively produced, with a useful, selected bibliography. And while it may have only limited direct effect on research programmes, all experimenters will be grateful to Dr. Leopold for his energetic presentation.

E.S.J.H.

4458. Löschnig, J., and Passecker, F.
Die Marille (Aprikose) und ihre Kultur.
(The apricot and its culture.)
Österreichischer Agrarverlag, Vienna, 1954, 9½×7 in., pp. 363, bibl. 88, 6 colour plates, illus., S (Austrian) 136, or DM. 22.80.

We have here a monograph by experts on a crop which has received all too little attention. The cover is wide, yet important aspects are dealt with in detail. Löschnig was responsible for its original conception and for many sections, Passecker for other sections and for final editing after the death of Löschnig, and L. Fulmek for a short section on pests and diseases.

The authors deal in turn with (1) general topics, such as botany and distribution of the apricot; (2) cultural aspects, including the specification of environmental needs and the determination from indicator plants of the extent to which these are met, and valuation of trees for insurance purposes; (3) fruit utilization, domestic and industrial; (4) variety descriptions, and (5) breeding and selection of varieties and rootstocks.

Part 4, which constitutes half the book, concerns the pomological classification and description of varieties in Europe (98), Central Asia (53), Manchuria and Siberia (6) and of the so-called cherry plum group (8), which consists of natural hybrids between *Armeniaca vulgaris* and *Prunus cerasifera*. This section includes pioneer work by Löschnig and is well supported by colour plates and line drawings. A special feature is the description of an ingeniously simple method of getting prints from cross sections and from the side of the stone for identification purposes.

This publication will be of great value in all regions where the apricot is grown.

V.H.G.

4459. Miehe, H., and Mevius, W.
Taschenbuch der Botanik. Erster Teil: Morphologie, Anatomie, Fortpflanzung, Entwicklungsgeschichte, Physiologie. **(Pocket book of botany. Part I: Morphology, anatomy, propagation, development, physiology.)**
Georg Thieme Verlag, Stuttgart, 16th revised edition, 1955, 9½×6½ in., pp. 287, illus., DM. 10.50.

This pocket book has been of service to generations of students reading botany as a main or as a subsidiary subject. Thanks to its frequent revisions it is as useful today as it was about 30 years ago when the reviewer had to revise his botanical knowledge in the shadow of an imminent examination. The latest edition, of which some sections on nutrition and growth were re-written in the light of recent advances in tracer techniques and hormone studies, deserves praise for the quality of its 363 illustrations. For a note on part II: taxonomy, see *H.A.*, 23: 4735.

V.H.G.

4460. Wardlaw, C. W.
Embryogenesis in plants.
Methuen and Co, London; John Wiley and Sons, New York, 1955, 9×6 in., pp. 381, bibl., pp. 28, illus., 42s.

In plants the embryo is defined as the rudimentary plant contained in the seed. Since this definition would have greatly limited the scope of the book, Professor Wardlaw has interpreted "Embryo" in such a way as to include development in the Algae, Bryophyta, Psilotales, Equisetales, Lycopodineae, and the ferns. Indeed, the first ten chapters, comprising 170 pages, are devoted to these more primitive groups, while the true flowering plants are dealt with in some 70 pages.

There is no doubt that Professor Wardlaw has done a great service to a specialized branch of science in gathering together all the mass of data contained in this book. It is hoped that this will stimulate further work on plant embryogeny so as to advance our knowledge of the subject at least to the level of the comparable field in zoology. Apart from the more straightforward knowledge of planes of cell division and of polarity in the earliest stages of embryo development, the science of embryogeny is still largely in its infancy and ideas as to causation of the various phenomena appear distinctly nebulus. In the author's own words: "What factors are involved in the assumption of form, and in the successive changes in form, during the ontogenetic development, and likewise in the differentiation of the increasingly complex tissue systems? These are questions which we must attempt to answer. . . . Even if we cannot explain any but a few of the phenomena, it is important for the advancement of botanical science that the relevant problems should be clearly before us."

In the section dealing with flowering plants there is a valuable discussion of comparative embryology in relation to taxonomy, but here again the limited extent of our present knowledge is all too evident. This is in no sense a criticism of the present work, indeed the author constantly stresses the vast field still to be explored, and workers in this field should find his discussions of the various problems both stimulating and valuable.

The penultimate chapter includes sections on induced parthenogenesis and on embryo culture which should prove of particular interest to plant breeders.

The publishers are to be congratulated on the standard of printing and the clarity of diagrams: the reviewer found only one typographical error in the whole book.
R.L.K.

4461. WORMALD, H.
Diseases of fruits and hops.
Crosby Lockwood, London, 3rd edition, 1955, 9½×5½ in., pp. 325, bibl. 530, illus., 25s.

Dr. Wormald's classic, first published in 1939 and re-issued with addenda in 1946, now appears in an entirely-revised third edition. While the broad pattern of the chapters remains unchanged, the additions and alterations to the text provide an epitome of the advances made during the past 15 years in our knowledge of fruit and hop diseases.

Such advances figure most prominently in the surveys of the virus diseases of apple, plum, cherry, raspberry, strawberry and hop: here both text and plates reflect the recent explorations of a field in which East Malling Research Station has played a leading part. Among other noteworthy emendations are those in the sections dealing with mineral deficiencies and with spraying practices and in the accounts of red-core, "cauliflower" and leaf-blotch diseases of strawberry.

Owners of hard-used copies of the earlier editions are given every encouragement to purchase the up-to-date version by its moderate price. With 35 more pages and 9 more plates than the pre-war issue, it still costs only 25s. compared with the 17s. 6d. of 1939. In common with the other volumes of Lockwood's Agricultural and Horticultural Series, the new edition maintains a high standard of production and binding. R.W.M.

Annuals and reports.

4462. BRITISH HONDURAS.
Annual Report of the Department of Agriculture, British Honduras, for the year 1954, pp. 42.

Research included sugar cane fertilizer and variety trials, coconut fertilizer trials, pineapple fertilizer and variety trials, plantain fertilizer trials, citrus fertilizer and trace element trials and various kidney bean trials.

4463. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM. (SCHUPHAN, W.)
Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse, Geisenheim/Rheingau. Tätigkeitsbericht 1 April 1954–31Marz 1955 **(Annual Report of the Federal Institute for Quality Research in Plant Products, Geisenheim, 1 April 1954 to 31 March 1955.)** 1955, pp. 32, bibl. 9, illus.

Research was again concentrated on the nutritional value of plant products and work has continued on many of the projects noted in the previous report [*H.A.*, 24: 3298]. The culinary and nutritional value of the young cauliflower leaves enclosing the curd is emphasized in an appendix.

4464. CORNELL.
67th Annual Report Cornell University Agricultural Experiment Station 1953-54, 1955, pp. 119, bibls.

The following are among the research projects listed (p. 62 onwards): *Agricultural economics:* Five projects on the packing and/or marketing of fruit, vegetables and flowers. *Botany:* Content of protein nitrogen in apple leaves after application of urea; germination of vanilla seed; botany of rhubarb; induced tetraploidy in cantaloupes; cytology of iris; physiology of bud dormancy; nutrition of peppermint; salt absorption and translocation. *Entomology:* Nicotine for apple pest control; effects of sprays on bees; botanical sources of insecticides; red spider on lima beans; pests of flowers and woody ornamentals; cucumber pests; carrot rust fly; spray deposits on apple leaves. *Floriculture and ornamental horticulture:* Day-length and temperature studies on chrysanthemum and gloxinia; 'timing' carnations to bloom at a specific date; tulip bulb storage; breaking apical dominance in chrysanthemum by foliage sprays; media for orchids; rose pruning; storage of cut flowers; effect of flowering on corm production in gladiolus; defoliation of nursery stock before digging. *Breeding:* Breeding cabbage, celery, bean, cucumber, melon, onion. *Plant pathology:* Diseases of ornamentals and fruit trees. *Pomology:* soil factors associated with differences in yield and behaviour of fruit crops; cold hardiness, nutrition, abscission, fruit thinning and storage of apples; thinning of peach fruits; soil fertility and nutrition of cacao and coffee. *Vegetable crops:* Soil management and breeding.

4465. D.S.I.R., LONDON.
Food Investigation 1954. being ***Report of the Food Investigation Board*** with the ***Report of the Director of Food Investigation for the year 1954.*** H.M. Stationery Office, London, 1955, pp. 72, 3s.

This report includes accounts of work in progress at the Low Temperature Research Station, Cambridge, at Ditton Laboratory and at Covent Garden Laboratory. The following lines of work are reported: Deep culture in the laboratory of edible fungi, notably *Pleurotus ortreatus* and *Coprinus comatus*; basic work on the chemistry of natural products occurring in foodstuffs, including phenolic constituents of plants, lignin in plant tissues, α-ketoacids, metabolism of peas, gummosis of plums, and enzymic and non-enzymic browning; the biochemistry of apple fruits; the storage of apples and pears, including conditions for storage, superficial scald of apples, volatile compounds produced by apples, lenticel rotting of apples, the effect of cultural conditions on chemical composition and storage life, and the structure of the lenticels of apple fruit; transport of soft fruit and storage of broccoli, celery, tomatoes and other vegetables; dehydration of fruits and vegetables; and storage and packhouse engineering.

4466. EAST MALLING.
Annual Report of East Malling Research Station 1954, 1955, A38, pp. 170, bibls., illus., 12s. 6d., U.S. $2.00.

As in the past the report consists of 4 parts: I. Notes on the experimental farm. II. A general review of research work completed and in progress in the various sections, including the new one working, in collaboration with the Ditton Laboratory, on the effect of orchard factors on the storage life of fruit. III. Research reports and reviews [see separate abstracts]. IV. Bulletins for fruit-growers, in the form of semi-popular reviews.

4467. FAO.
Yearbook of Food and Agricultural Statistics, 1954, Vol. VIII, Part 2. Trade. [English, French and Spanish.], Rome, 1955, pp. 347, $3.50 or 17s. 6d.

Basic statistics are given on world agricultural trade up to 31 December, 1954. Horticultural and plantation crops included are sugar, fruit, oilseeds, vegetable oils, coffee, tea, cacao and spices, beverages and tobacco, and fibres and rubber.

4468. FIJI.
Annual Report Fiji Department of Agriculture for 1954, Suva, 1955, pp. 18, 2s.

Subjects covered include cacao growing, the control of *Oryctes* spp. and *Graeffea crouani* on coconuts and of scab moth on bananas, and the introduction of parasites of fruit flies and of *Lantana.*

4469. GRILLOT, G.
Les travaux du service de la recherche agronomique et de l'expérimentation agricole en 1954. **(The work of the [Morocco] agronomic research and agricultural experimentation service in 1954.)**
Terre maroc., 1955, **29:** 123-38.

Work included selection of vegetables, castor, *Madia* (for seed oil), safflower, poppy and tobacco, and tobacco subsoiling and irrigation studies.

4470. HAWAII.
Biennial Report Hawaii Agricultural Experiment Station, 1952-1954, 1955, pp. 72, illus.

Investigations briefly summarized include: *Agricultural economics.* Marketing Hawaiian vegetables and fruits locally and in U.S.A. *Agricultural engineering.* Distribution of irrigation water, macadamia harvesting and husking machines*, and a passion fruit juice extractor. *Animal husbandry.* Sugar cane by-products as stock feed. *Entomology.* Bacteria and viruses for the control of lepidopterous pests of crucifers, and methods of controlling bean pests, *Dacus* spp., macadamia nut borer and cattleya fly. *Food and nutrition.* Vitamin C content of guava in relation to quick freezing, and cold storage of mangoes and bananas. *Horticulture.* A new coffee pruning method, macadamia training and selection, a new litchi variety, guava and passion fruit selection, papaw breeding, banana varieties, flower growing and weed control in orchids*. *Plant pathology.* Control of diseases of fruits, vegetables and ornamentals. *Plant physiology.* Sugar cane crop logging, coffee carbohydrate balance*, macadamia nutrition including Mg, banana fumigation and litchi flowering studies. *Soil and agricultural chemistry.* Guava and passion fruit juice manufacture.

4471. INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE.
Station Centrale de Génétique et d'Amélioration des Plantes. Rapport d'activité pour l'année 1954. **(Annual Report of the Plant Genetics and Selection Station, [Versailles], for 1954),** stencilled, pp. 118.

Investigations include: Beans: selection, yield trials and morphological studies. Peas: studies on French types including canning varieties. Cider apples: morphological and varietal studies.

4472. INSTITUUT VOOR TUINBOUWTECHNIEK, WAGENINGEN.
Jaarverslag 1954, Instituut voor Tuinbouwtechniek, Wageningen. **(Annual Report for 1954 of the Institute of Horticultural Engineering, Wageningen),** pp. 60, illus.

Among the many research projects reported are the following: Heating glasshouses with a naked flame (oil vapourizer) caused scorching of spinach, lettuce and tomato plants, but cauliflowers were more resistant. Frame-grown cucumbers produced higher quality and yields in fermenting manure than when heated by other methods. Roof-fan ventilators dried out the top soil below them, so that the temperature was raised; tomato plants beneath the ventilators were earlier in flowering, fruit setting and fruit ripening than those in the rest of the house. Hand-planted onions gave a higher yield than machine-planted onions. Differences in the porosity and pH of clay flower pots were reflected in growth of begonias and pelargoniums. For frost protection, a spray of 3 mm./hour was satisfactory, when the wind was less than 1 m./sec. and the interval between applications less than 1 minute. Satisfactory watering of tomatoes and begonias in pots was obtained when the pots stood on a gravel-filled bench, with the water level just below the surface of the gravel. Mosaic virus in both unsprayed and milk-sprayed tomato plants was about 6%. A time and motion study of cherry picking is also described.

4473. I.R.S.I.A.
Rapport annuel de l'Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Exercice 1954. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1954),** Brussels, 1955, pp. 203.

The research programmes subsidized by the Institute are summarized in this administrative report. They include investigations on fruit growing, the use of isotopes in research on the nutrition of fruit trees and mushrooms, and studies on medicinal plants, tobacco, vegetables, plant virology and chicory.

4474. JERSEY.
Annual Report of the States Experimental Station, Howard Davis Farm, Trinity, Jersey, 1954, 1955, pp. 46.

This is the first report published by the station since 1939. *Bulbs.* The days gained by cool-storing bulbs for 6, 7, 8 or 9 weeks before planting are tabulated for 6 varieties of narcissus. Cool storage for 7-8 weeks is recommended for general commercial purposes. No significant difference in vigour or bulb increase has been noted in cooled compared with non-cooled stocks. Warm storage from the end of July before cooling has not advanced flowering date, but it may have been applied too late. Continuous flower production of muscari from mid-December to the end of February was obtained by cooling the bulbs for 6 weeks at weekly intervals from 14 August to 18 September. Weed control by pre-emergence sprays of 10% sulphuric acid or petroleum had no significant effect on quality or number of flowers of the daffodils King Alfred and Actaea and only a slight effect on increase in bulb weight. The effect on increase in bulb weight of growing narcissus bulbs under grass varied with variety. Grass culture had no significant effect on stalk length or flower quality, but flowering of the variety Geranium was advanced by 8 days. Preliminary trials on anemone spacing are reported. Anemones have succeeded very well under moderately acid conditions. *Broccoli.* Variety trials. *Spring cabbage.* Variety, yield and top-dressing trials. *Didymella stem rot of tomato.* Results indicated that the disease is not commonly seed-transmitted in Jersey. Diseased haulms should be burnt. Trials with chemical soil drenches suggest that ethyl mercuric phosphate may be used with some benefit even on the outdoor crop. *Tomato root eelworm* (*Heterodera rostochiensis*). Treatment with DD resulted in almost double the yield of fruit, larger fruit and earlier maximum pick than no treatment. *Tomato russet mite* (*Vasates lycopersici*) was found in Jersey for the first time in 1949.

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* See separate abstract.

4475. JOHN INNES.
45th Annual Report of John Innes Horticultural Institution, 1954, 1955, pp. 36, 3s.

Breeding: Notes are given on breeding apples, which flower late and may thus avoid frost damage and which show scab resistance, and on frost susceptibility of diploid and tetraploid pears, stamen numbers in plums, strawberry breeding and selection for resistance to red-core and June yellows, raspberry and blackberry breeding, the breeding system of *Rosa canina*, comparative trials with rose stocks and scions on different soil types, and rose propagation by cuttings. *Genetics:* F_1 hybrids in tomatoes, incompatibility in *Oenothera*, mutation and heterocaryosis in *Cladosporium fulvum*, pollen competition and sporophytic characters in *Salpiglossis*, *Melandrium* and tomato, flower pigments in antirrhinum, and scent inheritance in freesia and sweet pea. *Physiology and plant culture:* Glasshouse climate, temperature and tomato flowering, steam sterilization, and methods of raising plants. [See also separate abstracts.]

4476. KENYA.
Annual Report of the Kenya Department of Agriculture for 1954, Vol. I, 1955, pp. 78, sh. 3/50.

Coffee: control of *Planococcus kenyae* (and its attendant ant, *Pheidole punctata*), *Diarthrothrips coffeae*, *Leucoptera* spp., *Parasa vivida*, *Habrochila placida*, and *Coccus africanus*; varietal, manurial and mulching trials; anti-leaf-fall copper and non-copper fungicide and hormone trials; studies on *Hemileia vastatrix*, growth control with maleic hydrazide, green-vein chlorosis and leaf Mn content under intensive cattle manuring. *Pyrethrum:* breeding; *Ramularia bellunensis* bud disease; weed-killer, stripping and fertilizer trials. *Sisal:* fertilizer, spacing, cutting, planting method, cultivation, *Agave* hybrid and herbicide (against *Digitaria scalarum*) trials. *Sugar cane:* variety and fertilizer trials. *Horticulture:* plum thinning, purée tomato and pineapple trials, and investigations on strawberry multiplication, youngberries and citrus seedlings *vs.* budded trees.

4477. KESTEREN.
Verslagen van de stichting "Boom en Vrucht" te Opheusden en het Rijkstuinbouwconsulentschap te Kesteren over de jaren 1953-1954. **(Reports of the "Tree and Fruit" Institute at Opheusden and the State Horticultural Advisory Service at Kesteren for the years 1953-1954)**, 1955, pp. 49.

The experimental garden "Boom en Vrucht" is set out on a river clay soil, and aims at demonstrating and translating the results of experimental work for growers on such soils. Work is largely concerned with fruit, but propagation of ornamental shrubs and trees is also carried out. Rootstock, intermediate scion, variety and pruning trials occupy the majority of the plots. Other experiments reported are on propagation, storage and manuring.

4478. NEW SOUTH WALES.
Report of the Department of Agriculture, New South Wales, for the year ended 30th June, 1954, 1954, pp. 79, illus, 7s.

Division of Plant Industry. Linseed breeding. Tobacco breeding. Vegetables: breeding, variety trials and seed production. *Division of Horticulture.* Citrus: control of wastage in storage, breeding, propagation, foliar nutrition, irrigation and rootstock trials. Bananas: disease and pest control, supplementary irrigation, plastic bunch covers and trace elements. Pineapples: off-flavour in frozen fruits. Pome fruits: sprays for thinning, and for preventing pre-harvest drop, foliar nutrition, breeding, storage and rootstocks. Stone, dried, berry and miscellaneous fruits and nuts: breeding and varieties, pruning, internal breakdown in apricots, foliar nutrition, sprays for chemical thinning, and for pre-harvest drop, canning, green manures, rootstocks, drying fruits, currant cincturing, cultural trials for boysenberry, youngberry and loganberry, hazel and macadamia nut trials, hormone setting of grapes, vine spacing and stock affinity. *Division of Science Services.* Disease and pest control in vegetables, fruits and ornamentals. Chemical residues on apples.

4479. PALMIRA.
Memoria Estación agrícola experimental de Palmira, 1953. **(Annual Report of the Palmira Agricultural Experimental Station for 1953)**, Palmira, Colombia, pp. 170, illus.

Research in 1953 included sugar cane breeding and selection, bean and castor variety trials, and investigations on bean, banana and cacao diseases. Information is also given on past work.

4480. ROTHAMSTED (LAWES AGRICULTURAL TRUST).
Report of the Rothamsted Experimental Station for 1954, Harpenden, 1955, pp. 242, 7s. 6d.

Several items of horticultural interest are abstracted separately. Information is also included on: effect of form and concentration of molybdenum on iron chlorosis, blotchy ripening of tomatoes, nutrient uptake by swedes from leaf sprays, biochemical effects of virus infection, virus studies, pea diseases, clubroot of crucifers, studies on insecticides and fungicides, bees and statistics.

4481. SCHNEIDER, M.
Agrarmeteorologische Bibliographie 1950. **(Bibliography of agricultural meteorology 1950.)**
Bibl. dtsch. Wetterdienst. **1,** 1955, pp. 129.

The bibliography contains 1543 abstracts and titles of papers received by the German Agro-Meteorological Service of the U.S. Zone during 1950. A detailed list of contents and an author index make it easy to locate individual references, many of which relate to crops and subjects of horticultural interest. An effort is being made to bring this annual series up to date so that in due course each bibliography will be published in the year following the period covered.

4482. SOUTH AUSTRALIA.
Report of the Minister of Agriculture for the year ended 30th June, 1954. 1955, pp. 65.

Horticultural research is chiefly concerned with the reduction of labour requirements and the costs of various horticultural practices; current projects relate to citrus, pome and stone fruits, vines and field crops

4483. SUDAN.
Annual Report of the Research Division, Ministry of Agriculture, Sudan, 1951/52, 1954, pp. 191, map.

This report is almost entirely devoted to cotton but includes accounts of work on some other crops and weed control. *Agronomy and Plant Physiology:* experiments with castor, safflower and sugar cane as alternative cash crops to cotton for the Gezira. *Botany and Plant Pathology:* control of *Cyperus rotundus* and of water weeds [see separate abstract], and resistance of peas to MCPA and 2,4-D herbicides.

4484. SUMMERLAND.
Progress Report Dominion Experimental Station Summerland, B.C., and Experimental Substation East Kelowna, B.C., 1949-1953, 1955, pp. 47, illus.

Investigations briefly reported include: *Tree fruits:* breeding, varieties and rootstocks; winter injury; fruit thinning, harvesting and storage. *Vegetables:* varieties, tomato and onion breeding, foundation seed and verification trial work. *Plant nutrition, soils and irrigation:* orchard irrigation and cover crops; tree fruit nutrition. *Fruit and vegetable processing:* tree fruit products and canning; tomato canning. *Ornamentals:* recent introductions among annuals and herbaceous perennials; winter injury to roses.

4485. WESTERN CANADIAN SOCIETY FOR HORTICULTURE.
Report of the Proceedings of the Eleventh Annual Meeting of the Western Canadian Society for Horticulture 1955, Banff, Alberta, 1955, cyclostyled pp. 118.

Several papers have been abstracted separately. Among other papers in the Proceedings are: (1) Recent ornamental introductions listed in 1955 (pp. 14-21); (2) D. H. Dabbs, A survey on the availability and hardiness of *Rubus* spp. being grown at Prairie Horticultural Institutions (pp. 33-9); (4) V. Chanasyk, The exosmosis method for determining hardiness and its possible application on the Prairies (pp. 54-6, bibl. 11); (4) Report of the Fruits Committee on new varieties of fruits for the Prairie Provinces (pp. 60-2), with descriptions; (5) I. L. Nonnecke, The Prairie vegetable trials in 1954 (pp. 73-80).

New periodicals.

4486. HULTON PRESS LTD.
The Agricultural Review [*Agric. Rev.*], 1955, Vol. 1, Nos. 1, 2 and 3, 9½×7¼ in., pp. 66, 66 and 74, illus., Hulton Press Ltd., 43 Shoe Lane, London, E.C.4, 30s. a year post free or 2s. 6d. a number.

This new monthly review, edited by Sir James Scott Watson, aims to serve farmers in Western Europe and other temperate regions of the world. Its objects are to collect and publish the results of agricultural research, to provide, by the analysis of trends of demand and supply, a guide to the long-term planning of production and to discuss farm management. Articles of horticultural interest in the first 3 numbers are concerned with the use of selective herbicides in vegetables and other crops, the use of chelated iron compounds for the control of lime-induced chlorosis in fruit crops, substitutes for stable manure in market gardening, American tests on soil conditioners, and red spider mite infestation and control. Each number contains book reviews, an economic review and abstracts. The journal is attractively produced.

Noted.

4487.

a BERMUDA.
Reports of the Bermuda Department of Agriculture for 1953 and ***1954,*** pp. 10 and 9.

b BERMUDA.
Staff Reports of the Department of Agriculture for the year 1953, pp. 38.
Including that of the Plant Pathologist [see abstract 4175].

c BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE.
Agricultural Statistics Report, Year 1953, 1955, pp. 51.

d CANADA DEPARTMENT OF AGRICULTURE.
Annual Report of the Director, Experimental Farms Service, Department of Agriculture, Ottawa, Canada, 1953-1954, pp. 43, illus.
Part of report summarized in *H.A.*, 25: 2287.

e CANADA DEPARTMENT OF AGRICULTURE.
Report of the Director of Science Service for the year ended March 31, 1954, pp. 64, reprinted from *Report of the Minister of Agriculture for the year ended 31 March, 1954.*
See *H.A.*, 25: 2287.

f CONNECTICUT (STORRS).
Report of the Storrs Agricultural Experiment Station for the year ending June 30, 1953, being *Bull.* **311,** 1954, pp. 26.
Mainly a list of research projects on flowers, tree fruits, vegetables, etc.

g DELAWARE.
You—and Delaware's farm progress, being the *Annual Report of the Agricultural Extension Service and Agricultural Experiment Station, University of Delaware, 1952-1953,* pp. 14, illus.
Including progress in fruit and vegetable production.

h EDINBURGH SCHOOL OF AGRICULTURE.
Guide to field experiments, demonstrations and farm crops, 1955, pp. 90.

i EFFORD (N.A.A.S.)
Station Guide 1955, Efford Experimental Horticulture Station, Efford, Hants, pp. 36.

j EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANISATION (EPPO).
Progress Report of the European and Mediterranean Plant Protection Organisation, 1954-55, Paris, 1955, pp. 31 [French and English].

k IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.
Report of the Governing Body and the Principal's Report for 1953-54, 1955, St. Augustine, Trinidad, and 40 Norfolk Street, London, W.C.2, pp. 54.
See abstracts 4344 and 4353.

l LUDDINGTON (N.A.A.S.)
Report of the Luddington Experimental Horticulture Station for 1954, Stratford-on-Avon, 1955, pp. 65, illus.
See separate abstracts.

m NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE.
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